

Curraghleannagh Bog (SAC 002350), Co. Galway

Executive Summary

This survey, carried out in October 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43/EEC) on the high bog at Curraghleannagh Bog. Vegetation was described and mapped based on raised bog ecotope vegetation community complexes (Kelly and Schouten, 2002). The following Annex I habitats occur: Active Raised Bog, Degraded Raised Bog and Depressions on peat substrates of the Rhynchosporion.

Active Raised Bog (ARB) covers 9.84 ha (6.72%) of the high bog area. There are two areas of central ecotope surrounded by sub-central ecotope. These are characterised by pools, lawns, hummocks, hollows and high *Sphagnum* cover of up to 75%. There are five other areas of sub-central ecotope. Degraded Raised Bog (DRB) covers 136.54ha (93.28%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses (4-25%). It has a less developed micro-topography, while permanent pools and *Sphagnum* lawns are generally absent. The sub-marginal ecotope covers about 2/3 of the Degraded Raised Bog area and has hardly changed in the reporting period. The marginal covering less than 1/3 of the DRB has reduced in area by (-) 1.84ha due to peat cutting. Face bank has increased slightly, also due drying out processes associated with peat cutting. The habitat also includes four inactive flushes which have slightly decreased in area since 2004 also as a result of peat cutting. Depressions on peat substrates of the Rhynchosporion are found in both Active and Degraded Raised Bog, but tend to be best developed and most stable in the wettest areas of Active Raised Bog. There has not been any significant change in this habitat in the reporting period.

Coillte have undertaken raised bog restoration works under an EU LIFE project. The mature Coillte conifer plantation (40+ ha) located mainly on cutover adjacent to the north-west of the site but including 1ha of it on high bog was felled in 2005. The associated drains were blocked in 2007 and the ongoing vegetation and hydrological monitoring indicate that water levels are rising in both the cutover and high bog habitats. This is a very positive impact which will facilitate the

restoration (on high bog only) of peat forming habitat. On the cutover, it is expected that other wetland habitat will develop as the remaining peat is too thin.

The current conservation objective for Curraghleannagh Bog is to restore the area of Active Raised Bog to the area present when the Habitats Directive came into force in 1994. In the case of Active Raised Bog, the objective also includes the restoration of all of the sub-marginal ecotope present at the time as this represents the area of Degraded Raised Bog most technically feasible to restore. The Area objective for Active Raised Bog is 43.8ha. The objective in relation to Structure and Functions (S&Fs) is that at least half of the Active Raised Bog area should be made up of the central ecotope and active flush (i.e. the wetter vegetation communities). These values have been set as Favourable Reference Values or FRVs until more site specific values can be set based on hydrological and topographical studies. The objective for Degraded Raised Bog is for the sub-marginal area to be restored to active peat forming communities as stated above and that no loss to peat extraction or degradation of any kind occurs. Although FRVs could not be established for the Rhynchosporion depressions, the objectives are increasing its extent and improving its quality to values associated with a favourable conservation status of Active Raised Bog. Therefore, the habitat's objectives are indirectly associated with Active Raised Bog objectives.

The area of Active Raised Bog (9.84ha) at Curraghleannagh Bog has not changed in the 2004 to 2012 period. More comprehensive surveying in 2012 enabled more accurate mapping of ecotope boundaries. As a result the distribution of central and sub-central ecotope was quite different to 2004 survey results. Two areas of central and four areas of sub-central ecotope were newly mapped in 2012, in addition to those that had already been mapped in 2004, and, the location of the boundaries of each area was refined. Hence the 2012 results were also given as the 2004 (amended) values, which were considered to be more accurate than the original 2004. Some new peat forming areas have been described at the site, which are the result of a more comprehensive field mapping rather than actual changes.

An active flush (U) was newly mapped this year on the eastern side of the bog. This flush was mapped as inactive in 2004. Drainage and former peat cutting upslope of this area caused subsidence and a bog burst, which then resulted in a localised area re-wetting and becoming colonised by *Sphagnum* lawns. This change is considered to be the result of more comprehensive surveying and re-interpretation of vegetation and therefore not a real change.

Peat cutting and associated drainage around the perimeter of the high bog are the most threatening current activities at the site. 1.94ha of high bog have been lost in the reporting period due to peat cutting and this activity is considered to be one of the reasons for the decline in Degraded Raised

Bog. 6.471km of drains remain functional and 3.031km reduced functional. The removal of the Coillte conifer plantation on cutover adjacent to the north-west of the bog and partly on high bog, and the blocking of associated drains by Coillte EU LIFE project is a positive impact which will facilitate in the restoration of some Active Raised Bog habitat.

Active Raised Bog has been given an overall **Unfavourable Bad-Declining** conservation status assessment. Habitat Area has not changed in the reporting period. However, current Area value is below favourable reference values, and S&Fs is also below reference value. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and) continue to threaten the habitat.

Degraded Raised Bog has been given an overall **Unfavourable Bad-Declining** conservation assessment and **Rhynchosporion depressions** has been given an **Unfavourable Bad-Declining** conservation status assessment.

The **overall raised bog** at **Curraghleannagh SAC** has been given an **Unfavourable Bad-Declining** assessment.

A series of **recommendations** have been also given, these include: cessation of peat cutting; and blocking of functional and reduced functional drains on the high bog.; further hydrological and topographical studies to ascertain more accurate FRVs; further restoration works on the cutover bog adjacent the high bog, some of which is still planted with conifers. Further botanical surveys on the high bog and cutover to assess the efficiency of restoration works and an impact assessment of maintenance works on adjacent land drainage with a view to the potential of blocking these drains.

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Site identification

SAC Site Code	002350	6" Sheet:	GY 32
Grid Reference:	E1680/N2540	1:50,000 Sheet:	39
High Bog area (ha):	146.38ha ¹		
Dates of Visit:	01,02,04/10/2012		
Townlands:	Curraghleannagh, Rushestown, Milltown and Newforest.		

¹ The current extent of the high bog is 146.38ha, while that reported in 2004 was 146.99ha (Fernandez *et al.*, 2005). This discrepancy is partially the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2004. High bog area has also decreased in the 2004/05-2010 period due to peat cutting by 1.94ha. The actual high bog extent in 2004 was 148.32ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Curraghleannagh Bog is located 6km north of Mount Bellew. Kelly *et al.* (1995) grouped Curraghleannagh Bog with the raised bogs of East Galway. The site is surrounded by a series of designated raised bogs: Camderry Bog (SAC 2347) lies 3-4km to the northeast, Carrownagappul (SAC 1242) 2km to the south, Shankill West (SAC 326) 4km west south-west and Lough Lurgreen (SAC 301) 5-6km to the north west-north. It may be accessed from the road, which runs to the south-east, via a gravel track-way associated with peat cutting.

Description of the survey

The survey was carried out in October 2012 and involved a vegetation survey of the high bog at Curraghleannagh Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2004 by Fernandez *et al.* (2005). High bog vegetation was described and mapped, based on raised bog ecotope vegetation community complexes developed by Kelly and Schouten (2002). Detailed notes were taken on each community complex and any flushed areas that were present. These included: species lists; estimation of % cover of dominant species; percentage *Sphagnum* cover; evidence of damage (due to burning, peat cutting or drainage); micro-topography; ground firmness; and presence of *Cladonia* species. A list of photographic records is

given in Appendix II. The survey aimed to assess the conservation status of Habitats Directive (Council Directive 92/43/EEC) Annex I habitats on the high bog.

The entire high bog of Curraghleannagh Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2004 were surveyed in more detail. These are the areas where changes were likely to have occurred. Quadrats, which describe the micro-topographical features and indicator species, recorded in the 2004 project (Fernandez *et al.* 2005) were re-surveyed. The size of quadrats was 4m x 4m.

A GeoExplorer handheld GPS minicomputer (Trimble GeoXT) was used in the field to record quadrats, ecotope boundaries, location of vegetation complexes and other points of interest. The GPS positions of these features were logged and stored on Terrasync software (Trimble). Additional comments were stored as text fields in the device. Post processing of data was carried out, based on the Active GPS Network from Ordnance Survey Ireland, to obtain sub-metre accuracy of the data.

A digital vector format ecotope vegetation map was produced based on the spatial data collected during the survey using ArcGIS 9.3 and 2010 aerial photography. The Irish National Grid was used as the co-ordinate reference system. Vegetation complex and ecotope maps are given in Appendix IV.

Description of the high bog

Curraghleannagh raised bog is a Basin Bog (Cross, 1990) and was classified as a Western Raised Curraghleannagh Bog by Douglas and Mooney in 1984. It has a broadly oval shape with a central gentle dome which slopes towards the edges. There are three noticeably depressed areas. One is associated with drain bC at the northern part of the site where some subsidence has occurred due to increased water loss. The other two are related to subsidence and tear pools on the eastern side of the site.

Ecological Information

Raised Bog Annex I (Habitats Directive (92/43/EEC)) habitats

The following Raised Bog EU Annex I habitats, are found in Curraghleannagh Bog:

- Active Raised Bog (EU code 7110),

- Degraded Raised Bog (EU code 7120),
- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current Area of Active Raised Bog at Curraghleannagh Bog is 9.84ha (6.72%) of the high bog), which is a decrease of 12.59ha since 1994. Active Raised Bog includes central, sub-central and active flush ecotopes

Central ecotope was found two locations (**C2** and **C3**) (see Appendix IV, Map 1). **C3** is the smaller of the two central areas located in the northern half of the bog. The larger **C2** area is in the middle part of the high bog. Both have similar vegetation and share the same vegetation community complex 15. This is a wet central complex with pools (26-33%) and the ground is quaking. *Sphagnum* cover is high (51-75%) with *Sphagnum cuspidatum* (H1, P; 11-25%), *S. capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. magellanicum* (H; 4-10%), *S. denticulatum* (H; 4-10%) and *S. austinii* (H; <4%). The pools also contain *Menyanthes trifoliata* and *Drosera anglica*. *Rhynchospora alba* occurs (4-10%) around the pool edges and *Narthecium ossifragum* is found in the inter-pool areas.

Sub-central ecotope occurs around the two central areas as **Sc1** and **Sc2** as well as five other smaller sub-central areas around the site. Complex 9/7/6 +P is the most widespread community complex in the sub-central ecotope. Like the central complex, this is also wet with pools (11-25%) and the ground is very soft, but not quaking. *Eriophorum vaginatum* is frequent (11-25%) and *Narthecium ossifragum* is locally common (4-25%) in the inter-pool areas. *Sphagnum* cover is still high (51-75%), with a good diversity of hummock, hollow and pool *Sphagnum* species, as listed above, but no *S. austinii*. However, the western indicator *Racomitrium lanuginosum* is a feature of this complex 9/7/6 +P. In a few places where the cover of *Narthecium* is very low, the community complex is named complex 9/7+P. Other community complexes occurring in localised areas in the sub-central include complex 9/10 which is drier and characterised by an extensive spongy *Sphagnum* cover, mainly *S. capillifolium* (H; 11-25%), *S. papillosum* (H; 26-33%) and *Eriophorum vaginatum* (4-10%). Where heather (*Calluna vulgaris*) becomes tall and widespread it becomes complex 9/7/10.

There is one active flush (**U**) located on the eastern margin of the site where there has been a history of peat cutting and drainage. This has lead to subsidence of the peat and very large tear pools have formed. The flush **U** is donwslope of this, in a very wet area with locally high *Sphagnum* with *S.cuspidatum* and lawns of *S. papillosum* and *S. magellanicum* occur. In between the *Sphagnum* lawns and inter-pool areas, there are areas of low *Sphagnum* cover and bare peat.

Degraded Raised Bog (7120)

The current Area of Degraded Raised Bog at Curraghleannagh Bog is 136.54ha (93.28% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, as well as inactive flushes. Although some areas of Degraded Raised Bog have a relatively well-developed raised bog flora, they are affected by water loss to varying degrees, and are usually devoid of permanent pools.

The sub-marginal ecotope features the most developed micro-topography within the Degraded Raised Bog. Community complex 9/7/6 is the most widespread vegetation type, particularly in the north and west. Pools are few or absent. The *Sphagnum* cover is generally 11-25% and is dominated by *S. capillifolium*. *Narthecium* is a constant (11-25%) and locally up to 33%. This complex is quite variable, and if *Rhynchospora alba* increases to 4-10% this is named a variant complex 9/7/4. Likewise in other areas notably towards the perimeter on the eastern margin, *Carex panicea* is locally frequent and this becomes a variant complex 9/7/3. In slightly flushed areas with *Myrica gale* it is complex 9/7/6+My. A better quality sub-marginal vegetation is complex 9/7 is quite widespread in the south-western lobe and localised across the rest of the bog. Here there is a good *Sphagnum* cover, also dominated by *S. capillifolium* and *Eriophorum vaginatum* is frequent (11-33%), but *Narthecium* is absent. The other main sub-marginal vegetation community is complex 6/3. It is located closer to the edge of the ecotope in the north and west, where it tends to be drier. As the name suggests, both *Narthecium* and *Carex panicea* are constant. There are no pools and *Sphagnum* cover is variable (4-11%) and it often grades into marginal ecotope communities.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. The micro-topography consists of *Calluna vulgaris* hummocks, low *Sphagnum* hummocks, flats and very occasionally hollows and tear pools. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (<10%). The main community complex is complex 3/6 and the vegetation is characterised by a higher cover of *Carex panicea* (4-25%), and *Narthecium ossifragum* (up to 34-50%). Where *Trichophorum germanicum* is frequent, it becomes complex 3/6/2. The area to the south-east is slumping with tear pools and is named complex 3/6/2+TP.

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography, but on a fairly steep slope. On the west side near the edge, there is a new area of face bank complex 1 associated with active turf cutting <50m away and slumping.

The high bog also features four inactive flushes (**W**, **X**, **Y**, and **FZ**) all located at the margin of the high bog.

Flush W is located at the north-western edge of the bog. Stunted *Phragmites australis* (<1m high) is scattered (4-10% cover) with occasional *Molinia caerulea* (<4%) over a sub-marginal complex 9/7,

Flush X is also located on the western margin, a bit further south. It is a linear flush within an elongated depression. *Calluna vulgaris* (30cm high), dominates the vegetation with *Eriophorum spp.*, along with *Juncus effusus* and *Polytrichum sp.* moss.

Flush Y is also located on the western edge of the site. It is similar to W but with a higher *Sphagnum* cover (26-33%), it is drier. *Molinia caerulea* is 11-25% and there is a scattering of pine tree (*Pinus sylvestris*) saplings and a few birch (*Betula pubescens*) saplings within the flush.

Flush Z is located on the north-eastern margin of the bog, sloping down towards the edge of the high bog. It is relatively dry with occasional wet patches. *Sphagnum* cover is generally low. It is mainly *S. capillifolium*. *Calluna vulgaris* and *Molinia caerulea* dominate the vegetation with less *Phragmites australis*. There are scattered pine (*Pinus sylvestris*) saplings (1-3m tall).

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Curraghleannagh Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. Typical plant species include *Rhynchospora alba*, *Sphagnum cuspidatum*, *S. magellanicum*, *S. papillosum*, *Drosera anglica* and *Eriophorum angustifolium*. *R. alba*, was recorded in the following community complexes; central complex 15 (4-10%), sub-central complex 9/7/6+P (4-10%).

R. alba was also found within Degraded Raised Bog, but always associated with wet features such as hollows and run off channels. In the sub-marginal complex 9/7/6 it was (<4%), and complex 6/3 also (<4%). The marginal complex 3/6/2 also had localised damp hollows with *R. alba* (<4%).

Rhynchospora fusca was not found on this site.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Curraghleannagh Bog is given in Appendix I. Vegetation is divided into a number of community complexes, which are listed and described based on the dominant species. These community complexes are grouped into ecotope types. The distribution of the ecotopes is shown on the ecotope map (Appendix IV, Map 1). The community complexes are shown on the community complex map

(Appendix IV, Map 2) and the quadrat details are given in Appendix III and their location in Appendix IV (Map 1).

Impacting activities

Table 6.1 below provides a list of activities impacting high bog vegetation at Curraghleannagh Bog, according to their occurrence on the high bog or adjacent to the high bog; area or length affected, and whether they influence negatively (i.e. drainage, peat extraction) or positively (i.e. restoration works):

Table 6.1 Impacting activities

Code	Activity	Ranking	Influence	Area (ha) /Length(km)	Location	Habitat affected
C01.03	Peat extraction	H	-1	1.94ha of the high bog cut away	Inside High Bog: 39different locations around high bog	7120
C01.03	Peat extraction	L	-1	1.94ha of the high bog cut away	Inside High Bog: 39different locations around high bog	7110/7150
J02.07	Drainage	M	-1	10.502 km ¹	Inside High Bog	7110/7120/7150
J02.07	Drainage	M	-1	n/av	Outside High Bog	7110/7120/7150
I01	Invasive alien species	L	-1	<0.1ha ³	Inside High Bog, western edge	7110/7120/7150
B01.02	Artificial planting on open ground (non-native trees)	L	-1	13.5ha	Outside High Bog adjacent to South side of high bog 200m from Eastern margin of high bog	7110/7120/7150
B02.02	Forestry clearance	M	+1	1ha	Inside High Bog; Coillte plantation felled – Coillte restoration	7110/7120/7150

					project Bog	
B02.02	Forestry clearance	M	+1	39.7ha	Outside High Bog ; Coillte plantation felled – Coillte restoration project Bog	7110/7120/7150
4.2	Restoring/Improving the hydrological regime	M	+1	n/av	Inside High Bog	7110/7120/7150
4.2	Restoring/Improving the hydrological regime	M	+1	n/av	Outside High Bog	7110/7120/7150
A04	Grazing	L	-1	<0.3ha	Southern edge of High Bog	7120

HB: High Bog; Ranking; H: High importance/impact; M: Medium importance/impact; L: Low importance/impact.

¹ This figure only includes functional and reduced-functional drains.

² This figure includes blocked drains on high bog.

³ This figure is estimated and represents the extent of trees across entire high bog

n/a: not applicable, n/av: not available

Peat cutting

This activity has taken place at 39 locations along the northern (4 locations (plots), east (18 locations), south (2 locations) and west (15 locations) section of high bog in the 2004-2010 period. This has reduced the area of high bog by 1.94ha. Cutting is particularly intense along the western section (E167388/N266057) and western section (E167232/N253308) of the high bog. The loss of high bog from peat cutting is calculated using GIS techniques on aerial photography from 2004/05 and 2010. Information from the NPWS indicates that 46 plots were cut on the high bog at Curraghleannagh Bog in 2010/2011; 4 were cut in 2012 and 5 in 2013. Thus the area of high bog lost on Curraghleannagh Bog during the reporting period is in excess of 1.94ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2012 cannot be estimated.

This activity is considered to have a high importance/impact on DRB high bog habitat. However as ARB has not decreased in area during the reporting period, it is considered that peat cutting has had a low importance/impact on ARB and Rhynchosporion depressions habitats. Nevertheless, old face banks and high bog and cutover drainage associated with cutting are likely to continue to cause negative impacts on the high bog habitats. In addition, the continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as restoration works cannot be employed until such activities stop. It should also be borne in mind that peat

cutting has already had a serious negative impact over a long period at this site, indicated by the fact that ARB covers only a very small area (9.84ha or 6.72% of the high bog) and is 77.53% below the FRV target.

Drainage

High bog drainage

Table 6.2 shows a decrease in the length of functional drains by 1.649km and an increase in the length of reduced functional drains by 1.449km. 200m of drains have been lost due to peat cutting. The majority of drains in the high bog remain functional (6.471km), or reduced functional (3.031km). Functional and reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely in-filled and thus non-functional.

High bog drainage is considered to have medium importance/impact on high bog habitats. A small high bog section (1ha) was restored as part of the Coilte raised bog restoration program in 2005-2007 on the north-west section of the site. This included the removal of a conifer plantation and blocking of associated drains. The actual length of these drains blocked is unknown. Restoration works mostly focused on the removal of the northwest cutover conifer plantation (40ha) and blocking of drains.

Table 6.2 High bog drainage summary

Status	2004 (km) ¹	2012 (km)	Change
NB: functional	7.920	6.471	(-)1.649
NB: reduced functional	1.582	3.031	(+)1.449
NB: non- functional	1.650	1.650	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	n/av	n/av
B: non- functional	0.000	0.000	0.000

B: Blocked; NB: Not blocked

¹ High bog drainage has been revised (e.g. re-digitised in cases) and figures above may vary slightly from those given by Fernandez *et al.* (2005)

Table 6.3 below provides a more detailed description of the drainage present on the high bog at Curraghleannagh Bog including any change in their functionality in the 2004 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
bA	5.304	NB: functional	NB: functional	No	Drain complex. These drains were wrongly classified as reduced functional in 2004
bA1	0.029	NB: non-functional	NB: non- functional	No	
bB	0.160	NB: functional	NB: functional	No	
bC	0.371	NB: functional	NB: functional	No	
bC1	0.365	NB: functional	NB: functional	No	
bD	0.279	NB: non-functional	NB: non- functional	No	
bE	0.220	NB: reduced functional	NB: reduced functional	No	
bF	0.216	NB: reduced functional	NB: reduced functional	No	
bG	0.236	NB: reduced functional	NB: reduced functional	No	
bH	0.216	NB: non-functional	NB: non- functional	No	
bM	0.174	NB: non-functional	NB: non- functional	No	
bN	0.120	NB: non-functional	NB: non- functional	No	
bO	1.449	NB: functional	NB: reduced functional	Yes	Some section remain functional and other non-functional within this long drain
bO	0.098	NB: functional	NB: functional	No	Northern section of drain bO; water running recorded during field survey
bO1	0.591	NB: non-functional	NB: non- functional	No	Drain complex
bP	0.569	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004
bQ	0.083	NB: functional	NB: functional	No	
bR	0.090	NB: functional	NB: functional	No	Drain already present in 2004 but not mapped
bS	0.341	NB: reduced functional	NB: reduced functional	No	Drain already present in 2004 but not mapped
bT	0.241	NB: non-functional	NB: non- functional	No	Drain already present in 2004 but not mapped

Bog margin drainage

The cutover areas were not surveyed for drains during 2012.

Drains associated with either currently active or no longer active peat cutting are present along the entire cutover, around the perimeter of the bog. These drains continue to drain the high bog and impacting on high bog habitats.

There is no obvious adjacent agriculture land drainage maintenance evident on the 2010 aerial photograph. But some maintenance on cutover drainage associated with peat cutting activity is likely to have taken place in the reporting period.

Cutover drains along the north-west section of the site were blocked as part of the Coillte raised bog restoration program after the removal of a conifer plantation (40ha) in 2005-2007.

Bog margin drainage is considered to have a medium importance/impact on high bog habitats.

Fire history

There is no evidence of recent fires on Curraghleannagh Bog noted during the 2012 survey. Fernandez *et al.* (2005) referred to a severe fire event in 1984, according to Mooney *et al.* (1984) that damaged 80% of the site. And there had been signs of burning in the north-west of the high bog noted in the 2004 survey. No fire events have been reported on the high bog in the 2004-2012 reporting period.

Invasive species

Some scattered young trees of lodgepole pine (*Pinus contorta*) and sitka spruce (*Picea sitchensis*) were reported in 2004 by Fernandez *et al.* (2005) along the south-western and north-western edges of the bog. These trees were recorded again during the 2012. Some of these pines are up to 3m in height, but quite dispersed.

Invasive species are considered to have low importance/impact on high bog habitats.

Afforestation and forestry management

A coniferous forestry plantation owned by Coillte, mainly *Pinus contorta* with some *Picea sitchensis*, which grew along the north-western and northern edges of the bog was felled in 2005 under the EU LIFE project. See Conservation activities below. There are two other conifer plantations; one located to the south (3.5ha) which is adjacent to the high bog edge (GR. 167583, 252481) and a second one (10ha.) located 200m from the eastern side of the bog.

Afforestation is considered to have low importance/impact on high bog habitats.

Other impacting activities

There is some grazing and poaching by cattle at southern edge along a band circa 150m long x 10-20m wide. This is considered to be a low importance/impact on Degraded Raised Bog habitat.

No other significant impacting activities were noted or recorded in 2012 impacting high bog habitats in the 2004-2012 reporting period.

Conservation activities

The removal of the Coillte plantation was undertaken in 2005 under the EU LIFE project (see website for further detail: <http://www.raisedbogrestoration.ie/life04/raised-bog-project-sites/curraghleannagh-bog-mountbellew-galway-ireland.html>). This included the removal of a conifer plantation (40.7ha) to the north-west of Curraghleannagh Bog. This included the blocking of drains with peat dams. Most of the plantation was on cutover bog, but part of it (ca. 1ha) was located on high bog according to Derwin (2008). The trees (Lodgepole pine and Sitka spruce) were felled in 2005 and drains were blocked in 2007. Vegetation monitoring and hydrological monitoring is ongoing since prior to felling. The results indicate that water levels have risen after drain blocking. Raised bog habitat is becoming established on the high bog clear-fell areas. The cutover areas will revert to wet woodland, as the peat is too thin to support raised bog habitat. Overall the restoration measures will improve the conservation value of the whole bog.

Removal of the Coillte conifer plantation and blocking of drains is a positive conservation activity. Thus forestry on the high bog is no longer a significant negative impact. The actual location of the removed high bog conifer plantation (ca. 1ha) could not be identified from the 2010 aerial photographs, thus whether the mentioned section is actually high bog or cutover should be confirmed through fieldwork.

Conservation status assessment

The assessment of the conservation status of Annex I Active and Degraded Raised Bog is based on the following(a more detailed description of conservation status assessment methods is given within the methods section of the project's Summary Report (Volume 1) :

AREA - comparison of current habitat Area with favourable reference values and its change in the reporting period to assess trends.

STRUCTURE & FUNCTION - comparison of central ecotope and active flush area (i.e. the higher quality wetter vegetation communities) for Active Raised Bog, and marginal and face bank ecotope area (i.e. the lower quality and drier vegetation communities) for Degraded Raised Bog against favourable reference values to assess their status and changes in their area in the reporting period to assess their trend. Community complex descriptions were also taken into account to evaluate changes in ecotope quality together with an analysis of the indicators recorded in the quadrats.

FUTURE PROSPECTS - an assessment of the influence of current and future activities both negative and positive (e.g. restoration works) affecting these habitats. Future Prospects for Active and Degraded Raised Bog are assessed at status and trend level based on the prospects for the habitat to reach favourable reference values in a two reporting period (12 years).

Active Raised Bog (7110)

Area

Table 8.1 shows no real change in the area of central ecotope in the reporting period, based on the amended 2004 figures. In 2004 only a very small area (0.06ha) of central (**C1**) was recorded. In 2012 there was a more comprehensive survey which revealed two other areas of central ecotope (**C2** and **C3**) which had not previously been mapped. The small **C1** area mapped in 2004 was interpreted not to conform to central vegetation and was reclassified as sub-central and included in the surrounding sub-central (**SC2**) area. Both **C2** and **C3** belong to complex 15.

The distribution of sub-central ecotope has changed a lot since it was last mapped in 2004. In 2004 there were three areas (**Sc1**, **Sc2** and **Sc3**). In 2012, as a result of more comprehensive surveying and mapping four additional areas of sub-central (**Sc4**, **Sc5**, **Sc6** and **Sc7**) were newly mapped. The boundaries of **Sc1**, **Sc2** and **Sc3** were more refined and the actual area of each decreased compared to the 2004 areas. The newly mapped sub-central areas (**Sc4**, **Sc5**, **Sc6** and **Sc7**) are relatively small areas, all about the same size which would explain why they were overlooked in the less comprehensive survey in 2004. They are located between the centre and the margin of the high bog and they form 'islands' of sub-central, surrounded by sub-marginal vegetation.

The active flush (**U**) is newly mapped in 2012 on the south-eastern margin of the bog. This is a wet area associated with former peat cutting and subsidence and the formation of large tear pools. Flush **U** is an area of active growing *Sphagnum* lawns, surrounded by more degraded peat. In 2004

this was part of a more extensive inactive flush. However, now a small section of flush **U** is deemed to be active peat forming. This is the result of a more comprehensive surveying and accurate mapping and re-interpretation of vegetation. Flush **U** is considered to be the result of slumping and subsidence associated with peat cutting and drainage, which would have caused further drying out into the high bog.

To summarise, although there has been no real change in ARB during the reporting period, the distribution and extent of central and sub-central ecotope has changed considerably, but this is due to more comprehensive surveying and better mapping. The area of central ecotope was confined to a small patch (**C1**) in 2004 is now two separate areas (**C2** and **C3**) covering almost 1ha. Similarly the sub-central ecotope has been more comprehensively mapped and as a result four new areas (**Sc4-Sc7**) have been mapped. The boundaries of the three sub-central areas (**Sc1-Sc3**) mapped in 2004 were more accurately mapped in 2012 and as a result were smaller in size.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central, sub-central ecotopes, and active flush) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 43.80ha (based on 1994/5 Kelly (1995) figures amended by Fernandez *et al.* (2005), see tables 8.1 and 8.3 below). This FRV is only approximate until further hydrological and topographical studies are carried out in order to assess the maximum potential capacity of the high bog to support Active Raised Bog. The current habitat Area value (9.84ha) is 77.53% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category. The long term (1994/5-2012) trend indicates a reduction in the area of Active Raised Bog at the site (12.59ha) (see table 8.1). A short term trend analysis (8 years 2004-2012) indicates not change. Thus the Area is given a **Stable** trend. **The Area of Active Raised Bog at Curraghleannagh Bog is assessed as Unfavourable Bad-Stable** (see table 8.5).

Structure & Functions

The FRV for S&Fs is for at least half of the active raised bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 4.92ha (half of 9.84ha, the current area of Active Raised Bog (excluding Bog Woodland)). The current value is 1.12ha which is 77.24% below FRV. Therefore S&Fs are given an **Unfavourable Bad** assessment. The long term (1994-2012) indicates an increase of the area of active flush as it was newly mapped in 2012. However, this cannot be taken as positive as this flush is the result of slumping and subsidence associated with peat cutting and drainage, which would have caused further drying out into the

high bog. The short term trend (2004 -2012) indicates no change in the area of active flush; therefore the S&Fs are given a **Stable** trend.

Quadrats analysis (**Qsc1, Qsc2 and Qsc3**) indicates the following:

Qsc1: this quadrat is located in the south-west edge of the sub-central area (**Sc2**). It was previously classified as sub-central complex 4/15 and is now complex 9/7/6+P. There are similarities and differences in the 2004 and 2012 surveys. Both had pools 26-33%, but total *Sphagnum* cover increased from 34-50% to 51-75% in 2012 and the *Sphagnum* species diversity was different. In 2004 *Sphagnum denticulatum* was the dominant pool *Sphagnum*, whereas in 2012 it was *S. cuspidatum*. *Sphagnum magellanicum* was present in 2004, but not in 2012. Nevertheless in the context of the wider habitat which is a mosaic, it was considered that these differences could be explained by a slight difference in location of the quadrat rather than a real change in vegetation.

Qsc2 This quadrat is located on the northern edge of the sub-central area (**Sc1**) It was previously classified as sub-central complex 7/9/10+P and is now sub-central complex 9/7/6+P . There has been an increase in the cover of pools from 26-33% in 2004 to 34-50% in 2012. But a decrease in *Sphagnum* covers from 51-75% to 34-50%. *S. cuspidatum* was recorded as the dominant pool *Sphagnum* in both years and given a cover value of 26-33% in 2004, but a 'absent' cover value given in 2012. This is likely to be an omission. *S. magellanicum* was present (4-10%) in both years. Overall it is considered that there has been no major change in the vegetation.

Qsc3 This quadrat was previously classified as central ecotope (Qc1; complex 15) It is now reclassified as sub-central complex 9/7/6+P. There are many similarities with the two quadrats in 2004 and 2012. Both were quaking with pools (26-33%) and total *Sphagnum* cover of 51-75%. The small differences included the presence of *Sphagnum magellanicum* and *S. austinii* in 2004 but not in 2012. However, it was considered that the vegetation was more typical of sub-central ecotope rather than central.

Typical good quality indicators and typical plant species are still found in sub-central and active flush throughout the entire bog.

The Structure & Functions of Active Raised Bog at Curraghleannagh Bog are assessed as Unfavourable Bad-Stable (see table 8.5).

Future Prospects

Although the habitat Area and S&Fs have not significantly changed in the 2004-2012 reporting period, considerable changes have taken place in the habitat's distribution due to more

comprehensive surveying and mapping in 2012. The effects of peat cutting and associated drainage continue to impact on the DRB and indirectly on the ARB. Peat cutting has caused subsidence on the eastern high bog margin. This has altered flow patterns, and resulted in slumping (flush U) where there is localised area of high *Sphagnum* growth, but the wider area around it is deteriorating with the formation of tear pools and bare peat in the inter-pool areas..

The removal of the Coillte conifer plantation (40.7ha) located north-west of the bog (including some trees planted on ca. 1.0ha of high bog) and blocking of drains associated with the clear fell area (as part of the Coillte EU LIFE Raised Bog Restoration project), is a positive step which will facilitate restoration of active bog on the clear-fell high bog area and other wetland habitats on the clear-fell cutover areas. This will stop the drainage impacts on the high bog from this conifer plantation. Nevertheless, the continuation of peat cutting at 39 locations around the bog and loss of 1.94ha of high bog due to peat cutting will continue to have adverse impact on DRB and ARB unless it is stopped.

Habitat **Area** is currently 77.53% below FRV (see table 8.4) and a Decreasing trend is foreseen due to the overriding influence of negatively impacting activities. The habitat Area is expected to be more than 15% below FRV in the following two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 77.24% below FRV (see table 8.4) and a Declining trend is also foreseen. Therefore S&Fs are expected to be more than 25% below FRV in the following two reporting periods. **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**. **The overall habitat's Future Prospects are Unfavourable Bad-Declining** (see table 8.5). Blocking of remaining reduced-functional and functional drains both on the high bog and cutover and cessation of peat cutting is necessary.

Cutover areas (particularly the western and northern) will play a major role in the restoration of the habitat as the current characteristics of the high bog (i.e. steep slopes caused by cutting and drainage) may make it difficult to regenerate previous Active Raised Bog values on the high bog.

The overall conservation status of Active Raised Bog at Curraghleannagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994 ¹	2004	2004 (amended)	2012	Change (2004-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	12.32	0.06	0.89	0.89	0.00	0.00
Sub-central	10.11	11.00	8.72	8.72	0.00	0.00
Active flush	0.00	0.00	0.23	0.23	0.00	0.00
Total	22.43	11.06	9.84	9.84	0.00	0.00

¹These are the figures calculated from the vegetation map drawn by Kelly *et al.*, (1995) that was geo-referenced, digitised and in some cases adjusted as part of Fernandez *et al.* (2005) project.

Note: Table 8.1 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	None	No longer present	This tiny area (0.06ha) mapped as central in 2004 was interpreted in 2012 as being part of the sub-central ecotope and so it was re-classified as sub-central (Sc2)	
C2	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
C3	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc1	Qsc2	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Qsc2 Slight changes in <i>Sphagnum</i> cover and species diversity, but broadly similar in 2004 and 2012
Sc2	Qsc1; Qsc3	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more	Qsc1 Slight changes in cover of <i>Sphagnum</i> and pools but broadly similar in 2004 and 2012

			accurate mapping.	Qsc3 former Qc1. Vegetation is quite similar to the 2004 quadrat. Re-classified as sub-central due to interpretation rather than a real change
Sc3	None	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc4	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc5	None	Unknown	This specific area was not comprehensively surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, also the result of re-interpretation of vegetation.	
Sc6	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc7	None	Unknown	This specific area was not surveyed in 2004. This is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
U	None	Possibly expanding	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, also the result of re-interpretation of vegetation. Further slumping and subsidence may have taken place at this location and encourage the potential expansion of this active flush. This would have also caused further drying out in the surrounding areas.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for area is 102.58ha at Curraghleannagh Bog. This value corresponds with the difference between the current high bog area (146.38ha) and the Active Raised Bog FRV (43.80ha) for area. Degraded Raised Bog is a particular habitat type, for which a FRV smaller than the current value, may be desirable in many sites. However any decrease in habitat area would only be considered positive, when it is the result of restoration to Active Raised Bog. Current habitat area is 33.11% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4). Table 8.3, shows a slight reduction in sub-marginal by (-) 0.03ha during the reporting period and a larger decrease in marginal area (-) 1.84ha due to peat cutting. The increase in face bank (+) 0.17ha is also due to peat cutting. There was also a further loss of inactive flush (-) 0.24ha. There was an overall reduction in the area of Degraded Raised Bog by (-) 1.3ha during the reporting period. This loss is due to peat cutting rather than restoration of DRB to ARB. As a result the habitat is given a **Decreasing** trend.

The Area of Degraded Raised Bog at Curraghleannagh Bog is assessed as Unfavourable Bad- Decreasing (see table 8.5).

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 34.14ha (25% of 136.54ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (44.07ha) is 29.11% above the FRV (in the particular case of Degraded Raised Bog a current area value equal or smaller than FRV is desirable) (see Table 8.4). A current value more than 25% above FRV falls into the **Unfavourable Bad** assessment category.

S&Fs trend is assessed based on actual changes within marginal and face banks ecotope (e.g. decreases due to rewetting processes or increases as a result of further drying out). Table 8.3 shows a significant decrease in marginal ecotope (-) 1.84ha due to peat cutting. Face bank increased by 0.51ha, but 0.34ha of FB was lost to peat cutting; hence Table 8.3 only shows a variation of (+) 0.17ha. The increase in face bank ecotope illustrates the decline in habitats S&Fs as a result of peat cutting. Thus, the DRB's S&Fs at Curraghleannagh are given a **Declining** trend.

Typical good quality indicators and typical plant species are still found throughout the entire bog on sub-marginal ecotope.

The Structure & functions of Degraded Raised Bog at Curraghleannagh Bog are assessed as Unfavourable Bad-Declining (see table 8.5).

Future Prospects

Degraded Raised Bog has decreased and its S&Fs declined as result of peat cutting. This activity continues at the site. Furthermore, drainage on the high bog and the area of bog burst near the south-east margin continues to damage the habitat and to hinder its recovery to FRVs, as well as minimising the chances to convert face bank and marginal ecotope into sub-marginal and/or Active Raised Bog. The raised bog restoration work at the north-west margin including removal of the Coillte plantation and blocking of drains is a positive step, but does not undo the impacts of peat cutting and drainage around the rest of the bog.

Habitat **Area** is currently 33.11% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 29.11% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods and thus **S&Fs** are expected to remain more than 25% above FRV. As a result, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

Therefore the Future Prospects for Degraded Raised Bog are considered Unfavourable Bad-Declining (see table 8.5).

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	1994 ¹	2004	2004 (amended)	2012	Change (2004-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-marginal	21.37	70.88	88.16	88.13	(-)0.03	(-)0.03
Marginal ²	95.49	55.32	42.83	40.99	(-)1.84	(-)4.30
Face bank ²	Na	5.63	2.91	3.08	(+)0.17	(+)5.84
Inactive flush	9.91	4.64	4.58	4.34	(-)0.24	(-)5.24
Total	126.77	136.47	138.48	136.54	(-)1.94	(-)1.40

¹These are the figures calculated from the vegetation map drawn by Kelly *et al.*, (1995) that was geo-referenced, digitised and in some cases adjusted as part of Fernandez *et al.* (2005) project.

² Any 2012 marginal and face bank ecotope value given within the report should be taken as a maximum value. Their extent is based in the 2012 habitat survey and 2010 aerial photographs. It cannot be ruled out that further marginal and/or face bank ecotope losses may have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting.

Note: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2012 illustrates the actual changes in ecotope area in the 2004-2012 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012.

The overall conservation status of Degraded Raised Bog at Curraghleannagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Depressions on peat substrates of the *Rhynchosporion* (7150)

Rhynchospora alba depressions are found across the entire bog in both Active and Degraded Raised Bog. The species is more frequently found and reaches its finest quality associated within wet features (*Sphagnum* pools, lawns and hollows) on Active Raised Bog.

The physical structure and distribution of the habitat across large sections of the high bog makes the process of calculating its area unfeasible and as a consequence makes the process of calculating realistic FRVs unfeasible. Thus, the assessment of the habitat Area conservation status is indirectly based on the assessment of Active Raised Bog habitat Area (a favourable assessment indicates that all sub-marginal ecotope has turned Active Raised Bog). The habitat Area is given an **Unfavourable Bad** assessment.

The Area trend assessment is based on the variation on Active Raised Bog and sub-marginal ecotope within Degraded Raised Bog in the reporting period. The area of Active Raised Bog has not changed in the reporting period and the sub-marginal extent has decreased only slightly by (-) 0.03ha. As result habitat Area is given a **Stable** trend.

The habitat's Area Future Prospects status is equally based on the Active Raised Bog Area Future Prospects status assessment and the Area Future Prospects trend is based on the trend expected for Active Raised Bog and sub-marginal ecotope in the following two reporting periods. Impacting activities such as peat cutting and drainage continue to negatively impact on Active and Degraded Raised Bog. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad-Decreasing** assessment.

The S&Fs conservation assessment is also indirectly based on the Active Raised Bog S&Fs status and trend assessments, as Active Raised Bog supports the finest habitat quality type. Therefore, the habitat's S&Fs are given an **Unfavourable Bad-Stable** assessment.

The habitat's S&Fs Future Prospects status and trend are equally based on the Active Raised Bog S&Fs Future Prospects status and trend assessments in the following two reporting periods. Therefore, the habitat's S&Fs Future Prospects are given an **Unfavourable Bad-Declining** assessment.

The overall habitat's Future Prospects assessment is Unfavourable Bad-Declining.

The conservation status of depressions on peat substrates of the Rhynchosporion at Curraghleannagh Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) ¹	2012 value (ha) ²	% below target	FRV 2012 Target (ha) ³	2012 value (ha) ⁴	% below target
7110	43.80	9.84	77.53	4.92	1.12	77.24
¹ 1994 central, sub-central, active flush, bog woodland and sub-marginal ecotope area.						
² 2012 central, sub-central ecotope, active flush and bog woodland area.						
³ Half of the current central, sub-central ecotope and active flush area. The target is that the area of the highest vegetation quality (i.e. central ecotope and active flush) should be at least this figure.						
⁴ 2012 central ecotope and active flush area.						
Habitat	FRV Target (ha) ⁵	2012 value (ha) ⁶	% above target	FRV 2012 Target (ha) ⁷	2012 value (ha) ⁸	% above target
7120	102.58	136.54	33.11	34.14	44.07	29.11
⁵ Current high bog area minus 7110 area FRV.						
⁶ 2012 Degraded Raised Bog area.						
⁷ 25% of the current Degraded Raised Bog habitat area. The target is that the extent of marginal and face bank ecotopes should not be larger than 25% of the current Degraded Raised Bog habitat area.						
⁸ Current marginal and face bank ecotopes area.						

As table 8.5 below indicates, each individual EU habitat present on the high bog has been given the following overall conservation status assessment based on the three main parameters (Area, S&Fs and future prospects) individual assessments:

- **Active Raised Bog is assessed as being Unfavourable Bad-Declining.**
- **Degraded Raised Bog is assessed as being Unfavourable Bad-Declining.**
- **Rhynchosporion depressions is assessed as being Unfavourable Bad-Declining.**

Table 8.5 Habitats conservation status assessments

Habitat	Area Assessment	Structure & Functions Assessment	Future Prospects Assessment	Overall Assessment
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7110	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and has taken place at 39 locations in the 2004/05-2010 reporting period. Additional NPWS information indicates that 46 plots were cut on the high bog at Curraghleannagh Bog in 2010/2011 and 4 were cut in 2012 and 5 in 2013. 1.94ha of high bog have been lost in the 2004/05-2010 period due to peat cutting and this activity is considered to be main direct reason for the decline in Degraded Raised Bog around the margin of high bog, but mainly on the eastern side.
- 6.4710km of drains on the high bog remain functional, but 200m of drain were lost to peat cutting since 2012. Most of the functional drains are associated with peat cutting on the western margin (drains bA, bB) and north-eastern (bC) and less so on the eastern side (bO, bQ). The reduced functional drains have increased to 3.031km.
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting is likely to continue to impact on the high bog habitats. There is no obvious adjacent agriculture land drainage maintenance visible from the 2010 aerial photograph.
- No fire events have damaged the high bog in the reporting period. There is a history of fire events on the site reported by Fernandez *et al.* (2005).
- Raised bog restoration work has been undertaken by Coillte in the north-west of the site by the removal of (40.7ha) of their conifer plantation in 2005 on cutover adjoining the high bog and partly on high bog (1ha) and blocking of associated drains. This is a positive activity which will assist in the restoration of some Active Raised Bog formation at this part of the bog.

Changes in active peat forming areas

- The area of Active Raised Bog has not changed in the reporting period; however the distribution of central and sub-central ecotope has considerably changed due to the more

comprehensive surveying and more accurate mapping of boundaries in the 2012 survey. This resulted in the mapping of two areas of central ecotope (**C2** and **C3**) which were not recorded in 2004. Also the boundaries of the three areas sub-central ecotope recorded in 2004 were refined, and their area reduced in the process.

- Four additional sub-central areas (**Sc4**, **Sc5**, **Sc6** and **Sc7**) have been newly mapped and described at the site. These 'new' sub-central ecotope areas are the result of a more comprehensive survey in 2012 rather than actual changes in Active Raised Bog vegetation.
- A small area of flush (**U**) has now been classified as active peat forming after a more comprehensive surveying. This is associated with a bog burst and subsidence of peat on the eastern side of the bog.

Other changes

- The Degraded Raised bog, notably the marginal by (-) 1.84ha has decreased due to peat cutting. Face bank ecotope extent has overall increased as a result of drying out processes and slumping associated with peat cutting despite direct losses also due to peat cutting.
- Four inactive flushes (**W**, **X**, **Y** and **Z**) located around the bog margins have decreased slightly in area by (-) 0.24ha in the reporting period due to peat cutting.

Quadrats analysis

- Quadrat **Qsc1** *Sphagnum* cover increased in 2012 and there were some differences in *Sphagnum* species diversity between 2004 and 2012, however the differences were not considered significant.
- **Qsc2**: There has been a decrease in *Sphagnum* cover and increase in the area of pools from 2004 to 2012, but like Qsc1, there are no major differences.
- Quadrat **Qsc3** was classified as sub-central in 2004. Although there are similarities in the vegetation of both year's it was interpreted as being more similar to sub-central rather than central and so was re-classified.

Restoration works

- Coillte have undertaken raised bog restoration works under the EU LIFE project. The mature Coillte conifer plantation (40+ ha) located mainly on cutover adjacent to the north-west of the site (but including 1ha of it on high bog) has been felled in 2005. The associated drains have been blocked in 2007 and the ongoing vegetation and hydrological monitoring indicate that water levels are rising in both the cutover and high bog habitats. This is a very

positive step which will facilitate the restoration (on high bog only) of peat forming habitat. On the cutover, it is expected that other wetland habitat will develop as the remaining peat is too thin.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Curraghleannagh Bog. Habitat Area has not changed in the reporting period. However both the current Area and S&Fs assessment values are below the FRVs by 77.53% and 77.24% respectively. Future prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) continue to threaten the habitat.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Curraghleannagh Bog. Habitat Area has decreased due to losses associated with peat cutting. Habitat's S&Fs have also declined due to peat cutting. Future Prospects are considered Unfavourable Bad-Declining due to threatening impacting activities.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Curraghleannagh Bog. Habitat Area and quality (S&Fs) are considered to have not changed in the reporting period. However, Future Prospects are considered Unfavourable Bad-Declining as a result of threatening impacting activities.

The conservation status of the **overall raised bog** at **Curraghleannagh SAC** is assessed as being **Unfavourable Bad-Declining**.

Recommendations

- **Cessation of peat cutting.**
- **Restoration works have taken place** in the north-west of the site by Coillte removing the conifer plantation and blocking drains; however, further restoration works are recommended including blocking of high bog reduced-functional and functional drains, as well as cutover drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** on the high bog in order to assess changes in the habitat's conservation status.

References

- Cross, J.R. 1987. Unusual stands of birch on bogs. *Irish Naturalist Journal* 22: 305-310
- Cross, J. R. 1990. *The Raised Bogs of Ireland: their Ecology, Status and Conservation*. Report to the Minister of State at the Department of Finance.
- Derwin, J. 2008. *Restoring Raised Bog in Ireland Project Ref. LIFE 04 NAT/IE/000121*. Report on the Restoration of Project site No. 3., Curraghleannagh Bog, Co. Galway
- Douglas, C. & Mooney, E. 1984. *Survey to locate raised bogs of scientific interest in Counties Galway (east) and Roscommon*. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.
- Fernandez, F., Fanning, M., McCorry, M. and Crowley, W. 2005. *Raised Bog Monitoring Project 2004-05*. Unpublished report, National Parks & Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.
- Kelly, L., Doak, M. and Dromey, M. 1995. *Raised Bog Restoration Project: An Investigation into the Conservation and Restoration of Selected Raised Bog Sites in Ireland*. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.
- Kelly, L. & Schouten, M.G.C. 2002. Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*, pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands.

Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complexes

COMPLEX 15

- **Location:** In two central areas (C2) in the centre of the site and C3 located towards the northern part of the bog.
- **Ground:** quaking
- **Physical indicators:** absent
- **Calluna height:** 21-30cm
- **Cladonia cover:** 4-10%
- **Macro-topography:** flat to slight depression
- **Pools:** 26-33%
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 4-10%
- **Micro- topography:** low hummocks/hollows/pools
- **Tussocks:** *Trichophorum germanicum* (<4%).
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Sphagnum cuspidatum* (H, P; 11-25%), *S. capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. magellanicum* (H; 4-10%), *S. denticulatum* (H; 4-10%), *S. austinii* (H; <4%). *Rhynchospora alba* (4-10%), *Trichophorum germanicum* (<4%). *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%).
- **Additional comments:** This complex was described from the vicinity of Qc1.

Sub-central Ecotope Complexes

COMPLEX 9/7/6 +P

- **Location:** this is the most widespread sub-central community complex at the site and it is found in all sub-central ecotope areas mapped (Sc1 to Sc7)

- **Ground:** very soft
- **Physical indicators:** absent
- **Calluna height:** 10-20cm
- **Cladonia cover:** absent
- **Macro-topography:** Flat, slight depression
- **Pools:** Regular, some formerly interconnecting (20%)
- **Sphagnum cover:** 51-75%
- **Narthecium cover:** 4-10%, up to 25% in places
- **Micro- topography:** Low hummocks/hollows/ pools and lawns
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (25-33%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (11-25%), *Sphagnum cuspidatum* (11-25%), *S. capillifolium* (H; 11-25%), *S. papillosum* (4-10%), *S. magellanicum* (<4%), *S. tenellum* (11-25%), *Narthecium ossifragum* (4-10%, up to 25% in places), *Carex panicea* (<4%), *Rhynchospora alba* (4-10%), *Racomitrium lanuginosum* (locally <4%).
- **Additional comments:** This was described from **Sc4**. In places the cover of pools decreases and is replaced by hollows. This area was not surveyed in 2004. Hence change is due to improved mapping accuracy. This complex is found in **Sc3** which is a more extensive area than was mapped in 2004. It has big interconnecting pools with islands of high hummocks with *Calluna vulgaris* and *Racomitrium lanuginosum*. The pool *Sphagna* is not so healthy, but at the edges there are lawns of *S. Magellanicum* and *S. papillosum*. The south side of **Sc2** has poor pool *Sphagna* with algae. The perimeter of the pools is dominated by *Rhynchospora alba*. **Sc7** is another newly mapped area of sub-central complex 9/7/6+P located south of the **Sc1**, just west of NE/SW drain (bC). >20% interconnecting pools with good *Sphagnum cuspidatum*, but with some algae. Good low hummocks of *S. magellanicum* and *S. papillosum* at the edge of the pools, and *Drosera anglica* and *Menyanthes trifoliata* in the pools. The inter-pool areas have low hummocks of *S. capillifolium* and *S. tenellum* along with *Narthecium ossifragum* in the hollows/flats. Total *Sphagnum* cover is 30-40%.

Complex 9/7+P is a variant of Complex 9/7/6 +P with very little *Narthecium ossifragum* and more *Eriophorum vaginatum* (25-33%)

COMPLEX 9/10

- **Location:** sub-central community complex recorded in isolated patches to the east and middle section of high bog , as well as south of **Sc7**

- **Ground:** very soft
- **Physical indicators:** absent
- ***Calluna* height:** 10-20cm
- ***Cladonia* cover:** absent
- **Macro-topography:** slight depression on a gentle slope
- **Pools:** absent, (locally <4%)
- ***Sphagnum* cover:** 50-75%
- ***Narthecium* cover:** 4-10%
- **Micro- topography:** low hummocks/hollows
- **Tussocks:** *Trichophorum germanicum* (<4%).
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Sphagnum cuspidatum* (H; 4-10%), *S. capillifolium* (H; 11-25%), *S. papillosum* (H; 26-33%), *S. magellanicum* (H; <4%), *S. tenellum* (H; <4%).
- **Additional comments:** This complex was described from a small area of sub-central ecotope with a soft carpet of *Sphagnum* surrounded by sub-marginal complex. In some areas within Sc1 and Sc6 there are no pools and *Calluna vulgaris* is tall and increases in cover to (26-33%), this complex then becomes 9/7/10.

Active Flushes

FLUSH U

Flush U is located on the eastern margin of the bog and is associated with peat slumping and subsidence. It is characterised by tear pools with open water and some algae. The whole area is very wet and *Sphagnum* cover is locally high with *S.cuspidatum* and lawns of *S. papillosum* and *S. magellanicum* occur. In between the *Sphagnum* lawns and inter-pool areas, there are areas of low *Sphagnum* cover and bare peat. In 2004 this area was recorded as an inactive flush U.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 6/3

- **Location:** Southwest side, near edge and on the eastern side of the bog, south of Sc4

- **Ground:** firm to soft
- **Physical indicators:** absent
- **Calluna height:** 20-30cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope to edge
- **Pools:** absent
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** 11-25%, in places 26-33%
- **Micro- topography:** Low hummocks/hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (25-33%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Rhynchospora alba* (<4%), *Carex panicea*, *Narthecium ossifragum* (11-25%, in places 26-33%)(4-10%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%).
- **Additional comments:** This area is low quality sub-marginal. Towards the northern part of the bog, north of Sc1, this complex grades into complex 6/3/2 where *Trichophorum vaginatum* cover is 4-10%.

COMPLEX 6/3+TP

- **Location:** East side of high bog near the edge
- **Ground:** firm to soft
- **Physical indicators:** tear pools
- **Calluna height:** 10-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope to edge, steeper near face bank
- **Pools:** Tear pools 4-10%
- **Sphagnum cover:** 11-25%
- **Narthecium cover:** 11-25%, in places 26-33%
- **Micro- topography:** Low hummocks/hollows/tear pools and flats
- **Tussocks:** *Trichophorum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4% and 4-10% near pools), *Rhynchospora alba* (<4%), *Carex panicea* (<4%),

Sphagnum cuspidatum (<4%), *S. denticulatum* (<4%), *S. capillifolium* (<4%), *S. papillosum* (<4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. austinii* (<4%), *Cladonia uncialis* (<4%), *Leucobryum glaucum* (<4%), *Pleurozia purpurea* (<4%), *Campylopus atrovirens* (<4%).

- **Additional comments:** This area was marked as Flush I on the 2004 map and is now considered to be complex 6/3+TP. The Tear pools are crescent shaped parallel to the slope and can be up to 10m long. They indicate subsidence of the peat.

COMPLEX 9/7

- **Location:** Mainly in the western part of the site, south-west of **Sc2**, and localized elsewhere throughout the site
- **Ground:** firm
- **Physical indicators:** absent
- **Calluna height:** 20-30cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope to N.E edge.
- **Pools:** absent
- **Sphagnum cover:** 11-25% in places 26-33%
- **Narthecium cover:** absent
- **Micro- topography:** Low hummocks/hollows
- **Tussocks:** *Trichophorum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Sphagnum capillifolium* (11-25%), *S. papillosum* (<4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *Trichophorum germanicum* (<4%).
- **Additional comments:** Characterized by a high spongy *Sphagnum* cover and no pools. Also the absence of *Narthecium ossifragum* which is frequent over much of the rest of the sub-marginal ecotope.

COMPLEX 9/7/6

- **Location:** This is the most widespread sub-marginal complex on Curraghleannagh Bog. It is frequently found across high bog, particularly along west and northern sections
- **Ground:** firm
- **Physical indicators:** absent
- **Calluna height:** 10-20cm

- **Cladonia cover:** <4% few
- **Macro-topography:** gentle slope to N.E edge.
- **Pools:** absent
- **Sphagnum cover:** 4-25%
- **Narthecium cover:** 11-25%
- **Micro- topography:** Low hummocks/hollows
- **Tussocks:** *Trichophorum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Rhynchospora alba* (<4%), *Sphagnum capillifolium* (4-10% and 11-25% in places), *S. papillosum* (<4%), *S. magellanicum* (<4%), *S. tenellum* (H; <4%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (11-25%), *Carex panicea* (<4%), *Sphagnum capillifolium* (4-10%), *S. papillosum* (<4%), *S. tenellum* (<4%), *S. subnitens* (<4%), *S. magellanicum* (<4%).
- **Additional comments:** The 9/7/6 complex covers much of the sub-marginal ecotope on the site. Where there are pools, this becomes complex 9/7/6 +P. It is localised mainly in the centre and eastern part of the site. The pools have a poor cover of *Sphagnum cuspidatum* (<4%). In places where *Myrica gale* is present this is called complex 9/7/6 +My.

COMPLEX 9/7/4

- **Location:** north of Sc4 between 2 drains bO at N.E.
- **Ground:** Very soft
- **Physical indicators:** absent
- **Calluna height:** 10-20cm
- **Cladonia cover:** 0
- **Macro-topography:** gentle slope to N.E edge.
- **Pools:** absent, hollows with water
- **Sphagnum cover:** 33-50%
- **Narthecium cover:** 4-10%
- **Micro- topography:** Low hummocks/hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** yes regeneration likely due to infilling of drains
- **Species cover:** *Calluna vulgaris* (25-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (25-33%), *E. angustifolium* (<4%), *Rhynchospora alba* (4-10%), *Carex panicea* (4-10%), *Sphagnum capillifolium* (4-

10%), *S. papillosum* (<4%), *S. magellanicum* (<4%), *S. tenellum* (H; <4%), *S. cuspidatum* (<4%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (11-25%).

- **Additional comments:** complex 9/7/4 is a variant of complex 9/7/6, with frequent *Rhynchospora alba*. Where *Carex panicea* exceeds 4% and *Rhynchospora alba* <4%, it becomes complex 9/7/3. It is locally common around the northern and north-eastern edge of the site and occasionally elsewhere.

COMPLEX 9/7/6+P

- **Location:** this complex is mostly found surrounding sub-central ecotope areas (i.e. **Sc1, Sc2, Sc3, Sc4, Sc5** and **Sc7**)
- **Ground:** Soft to very soft
- **Physical indicators:** Some algae in pools
- **Calluna height:** 10-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** Flat
- **Pools:** Regular, 4-10%
- **Sphagnum cover:** 25-33%
- **Narthecium cover:** 11-25%
- **Micro- topography:** Low hummocks/hollows/pools
- **Tussocks:** *Trichophorum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (25-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (25-33%), *E. angustifolium* (<4%), *Rhynchospora alba* (<4%), *Carex panicea* (4-10% many), *Sphagnum cuspidatum* (<4%), *S. papillosum* (4-10%), *S. magellanicum* (<4%), *S. capillifolium* (11-25%), *S. tenellum* (H; <4%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (11-25%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%).
- **Additional comments:** In places the pools are nice with good *Sphagnum* cover almost sub-central like, but often the pools have poor *Sphagnum* cover and localised ones have algae. *Racomitrium lanuginosum* occurs here but is rare.

A variation of this is complex 9/7/6 + TP at E168008/N252917 at the eastern side of the high bog, where there are huge tear pools (20+m x 1m+ wide). There is almost no *Sphagnum* in the inter-pool area. The area is slumped in a slight depression.

Marginal Ecotope Complexes

COMPLEX 3/6/2

- **Location:** East , northeast and southwest section of high bog edge
- **Ground:** firm
- **Physical indicators:** bare peat (<4%)
- **Calluna height:** 10-20cm
- **Cladonia cover:** <4%
- **Macro-topography:** gentle slope to edge
- **Pools:** absent
- **Sphagnum cover:** 4-10%
- **Narthecium cover:** 34-50%
- **Micro- topography:** low hummocks/*Narthecium ossifragum* flats/ occasional hollows
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (<4%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (34-50%), *Trichophorum germanicum* (<4%), *Carex panicea* (4-10%), and up to 25% in places, *Rhynchospora alba* (<4%), *Sphagnum. capillifolium* (H; <4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; <4%).
- **Additional comments:** The area to the north-east is slumping with tear pools and becomes 3/6/2 +TP. Where *Trichophorum germanicum* is absent this complex is 3/6. The latest is very common at this site and was recorded across entire high bog edge.

COMPLEX 3/2 +ER (EROSION CHANNELS)

- **Location:** East side surrounding flush U
- **Ground:** firm
- **Physical indicators:** bare peat (4-10%)
- **Calluna height:** 1-10cm
- **Cladonia cover:** <4%
- **Macro-topography:** Steep slope
- **Pools:** Tear pools <4%
- **Sphagnum cover:** 4-10%
- **Narthecium cover:** 34-50%
- **Micro- topography:** low hummocks/*Narthecium ossifragum* flats/ and tear pools

- **Tussocks:** *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Carex panicea* (11-25%), and up to 25% in places, *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; <4%).
- **Additional comments:** None.

Inactive flushes

FLUSH; U, T, W, X, Y, Z

Flush T that was located on the south-east edge near the access point (2004 map) is now considered to be sub-marginal complex 6/3+TP and not a flush as such. It seems slumping has occurred here. Pools are crescent shaped.

Flush U This extends further eastwards from the active flush U. In the 2004 (Fernandez *et al.* report) reported that it was characterised by the presence of curvilinear tear pools, which contained algae, *Sphagnum cuspidatum*, open water and bare peat. Scattered patches of *S. magellanicum* and *S. papillosum* lawns are found, where *Rhynchospora alba* was common. This was not surveyed in detail in 2012.

Flush W is located at the north-western edge of the bog. Stunted *Phragmites australis* <1m high is scattered (4-10 %) with occasional *Molinia caerulea* (<4%) over a 9/7 sub-marginal complex, where *Calluna* is (33-50%) and *Cladonia portentosa* (11-25%) and *Sphagnum* cover is (11-25%) dominated by *S. capillofolium*.

Flush X is also located on the western margin; it is a linear flush within an elongated depression. *Calluna vulgaris* (30cm high), dominates the vegetation with *Eriophorum spp.*, along with *Juncus effusus* and *Polytrichum sp* moss.

Flush Y is located on the western edge of the site, a bit further north than X. It is similar to W but with a higher *Sphagnum* cover (26-33%), it is dry. *Molinia caerulea* is 11-25% and there is a scattering of pine tree (*Pinus sylvestris*) saplings and a few birch (*Betula pubescens*) saplings within the flush. *Cladonia* cover is (4-10%).

Flush Z is located on the north-eastern margin of the bog, sloping down towards the edge of the high bog. It is relatively dry with occasional wet patches. *Sphagnum* cover is generally low. It is mainly *S. capillifolium*. *Calluna vulgaris* and *Molinia caerulea* dominate the vegetation with less *Phragmites australis*. There are scattered pine (*Pinus sylvestris*) saplings (1-3m tall).

Face bank Complexes

COMPLEX 1

- **Location:** this complex was found along the bog margin
- **Ground:** firm
- **Physical indicators:** bare peat (4-10%), cracking in places
- **Calluna height:** 40-50cm
- **Cladonia cover:** <4%
- **Macro-topography:** steep slope
- **Pools:** absent
- **Sphagnum cover:** generally absent but <4% in places
- **Narthecium cover:** <4%
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence:** absent
- **Species cover:** *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Trichophorum germanicum* (<1%), *Narthecium ossifragum* (<4%), *Andromeda polifolia* (<1%), *Sphagnum capillifolium* (H; <1%), *S. tenellum* (H; <1%), *S. subnitens* (H; <1%), *Hypnum jutlandicum* (<4%).
- **Additional comments:** On the west side near the edge, there is a new area of Face bank 1 complex associated with active turf cutting <50m away and slumping. The ground is soft and *Calluna vulgaris* is 30-40cm high with 75-90% cover. Although the *Sphagnum* cover is <4%, the presence of dead *Sphagnum* suggests it seems to have been higher.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Curraghleannagh Bog in both Active and Degraded Raised Bog, but it is more frequent on Active Raised Bog habitat. Only *Rhynchospora alba* was recorded within the 2012 survey at this site. *Rhynchospora fusca* was not found.

R. alba is found in all ecotopes in Curraghleannagh Bog, as follows central complex 15 (4-10%), sub-central ecotope complex 9/7/6+P (4-10%), sub-marginal ecotope complex 9/7/6 (<4%), 6/3 (<4%) and marginal ecotope complex 3/6/2 (<4%).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum magellanicum*, *S. papillosum*, *S. cuspidatum*. It was also found within *Narthecium ossifragum* dominated hollows in sub-marginal and marginal ecotope complexes.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
0431	E	Overview	Qsc1	02/10/2012
0435	E	Overview	Qsc2	02/10/2012
0432	E	Overview	Qsc3	02/10/2012

Appendix III Quadrats

Ecotope type	Central	Sub-central	Sub-central	Sub-central
Complex Name	15	9/7/6+P	4/15	9/7/6+P
Quadrat Name	Qc1	Qsc3	Qsc1	Qsc1
Easting	167407	167449.94	167755	167764.31
Northing	253321	253314.30	253223	253227.99
Date	9/11/2004	02/10/2012	9/11/2004	02/10/2012
Firmness	quaking	Quaking	soft	Quaking
Burnt	No	No	No	No
Algae in hollows %	na	Absent	4-10	Absent
Algae in pools %	na	1-3 (few indiv)	na	Absent
Bare peat %	na	Absent	na	Absent
High hummocks %	na	Absent	na	Absent
Low hummocks %	34-50	26-33	26-33	76-90
Hollows %	11-25	1-3 (many indiv)	11-25	11-25
Lawns %	Absent	Absent	Absent	Absent
Pools %	26-33	26-33	26-33	26-33
Pool type	Interconnecting	Interconnecting	Interconnecting	Interconnecting
S.austinii hum type	na	Absent	na	Absent
S.austinii hum %	na	Absent	na	Absent
S.austinii height(cm)	na	Absent	na	Absent
S.fuscum hum type	na	Absent	na	Absent
S.fuscum hum %	na	Absent	na	Absent
S.fuscum height(cm)	na	Absent	na	Absent
Leucobryum glaucum	na	Absent	na	Absent
Trichophorum type	Flats	Flats	Flats	Flats
	1-3 (many indiv)	1-3 (several indiv)	1-3 (many indiv)	1-3 (many indiv)
Trichophorum %	1-3 (many indiv)	1-3 (several indiv)	1-3 (many indiv)	1-3 (many indiv)
S.magellanicum %	4-10	Absent	4-10	Absent
S.cuspidatum %	11-25	26-33	na	26-33
S.papillosum %	4-10	11-25	4-10	11-25
S.denticulatum %	4-10	Absent	4-10	Absent
S.capillifolium subsp. rubellum %	11-25	11-25	11-25	11-25
S.stenellum %	na	4-10	na	4-10

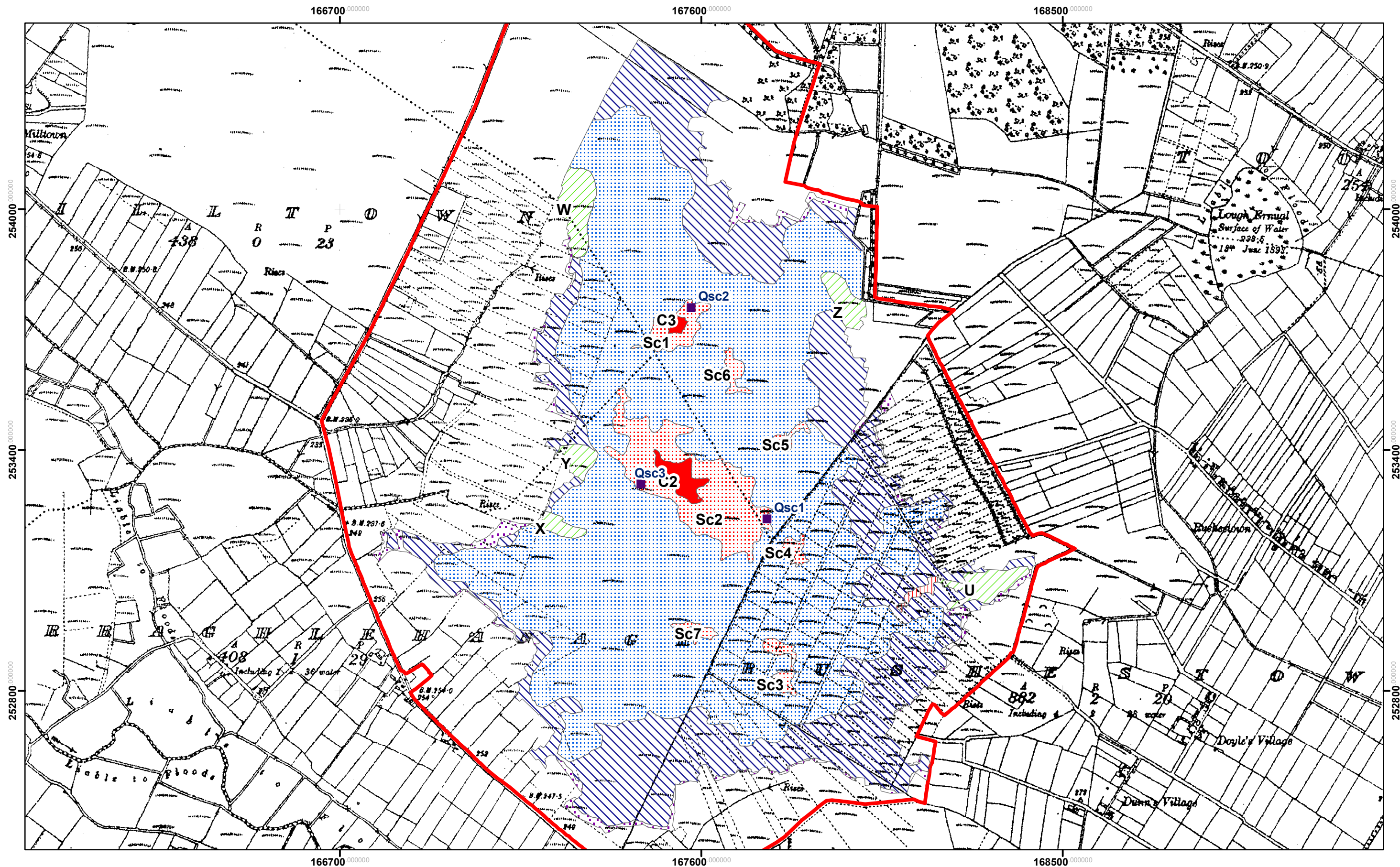
S.subnitens %	na	1-3 (several indiv)	na	Absent
R.fusca %	na	Absent	na	Absent
R.alba %	4-10	1-3 (many indiv)	11-25	4-10
N.ossifragum %	4-10	Absent	4-10	4-10
Sphag pools %	26-33	26-33	11-25	26-33
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S. denticulatum	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent	Absent
Sphag humm %	34-50	11-25	26-33	26-33
Sphag holl %	4-10	Absent	4-10	4-10
Total Sphag %	51-75	51-75	34-50	51-75
Hummocks indicators	S.austinii	Absent	na	Absent
Cladonia portent %	4-10	4-10	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	na	cvuncialis	na	C.uncialis
C. panicea %	na	1-3 (few indiv)	11-25	1-3 (few indiv)
Calluna cover %	11-25	11-25	11-25	Absent
Calluna height(cm)	21-30	11-20	21-30	11-20
Other NotableSpecies		menyqntes tri Dros anglica		M.trifoliata,D.anglica C.atrovirens
Other comment		formerly qc1 . no S. mag discrepancy with 2204		discrepancies due to slight different location

Ecotope type	Sub-central	Sub-central
Complex Name	7/9/10+P	9/7/6+P
Quadrat Name	Qsc2	Qsc2
Easting	167571	167574.92
Northing	253753	253754.14
Date	9/11/2004	02/10/2012
Firmness	very soft	
Burnt	No	No
Algae in hollows %	Absent	Absent
Algae in pools %	Absent	Absent
Bare peat %	Absent	Absent
High hummocks %	na	4-10
Low hummocks %	26-33	26-33
Hollows %	1-3 (many indiv)	4-10
Lawns %	Absent	Absent
Pools %	26-33	34-50
Pool type	Interconnecting	Absent
S.austinii hum type	na	Absent
S.austinii hum %	Absent	Absent

S.austinii height(cm)	na	Absent
S.fuscum hum type	na	Absent
S.fuscum hum %	Absent	Absent
S.fuscum height(cm)	na	Absent
Leucobryum glaucum	Absent	Absent
Trichophorum type	Tussocks	Tussocks
Trichophorum %	1-3 (many indiv)	4-10
S.magellanicum %	4-10	4-10
S.cuspidatum %	26-33	Absent
S.papillosum %	4-10	Absent
S.denticulatum %	Absent	Absent
S.capillifolium subsp. rubellum %	4-10	11-25
S.tenellum %	na	Absent
S.subnitens %	1-3 (many indiv)	Absent
R.fusca %	na	Absent
R.alba %	Absent	1-3 (many indiv)
N.ossifragum %	1-3 (many indiv)	11-25
Sphag pools %	26-33	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent
Sphag humm %	26-33	Absent
Sphag holl %	1-3 (many indiv)	1-3 (several indiv)
Total Sphag %	51-75	34-50
Hummocks indicators	Absent	Absent
Cladonia portent %	4-10	4-10
Other Cladonia sp	na	
C. panicea %	1-3 (many indiv)	1-3 (many indiv)
Calluna cover %	34-50	26-33
Calluna height(cm)	21-30	11-20
Other NotableSpecies		Menyanthes tri, Dros anglica
Other comment		

Note: Data for those 2004 quadrats re-surveyed in 2012 is given to the right of the original 2004 quadrat data in table above. Not all quadrats reported in 2004 were re-surveyed in 2012. Nonetheless, all 2004 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2004 quadrats may have been classified under a different ecotope category in 2012; further detail is given within the report.

Appendix IV Survey maps



Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

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Curraghlehanagh SAC (002350) Co. Galway

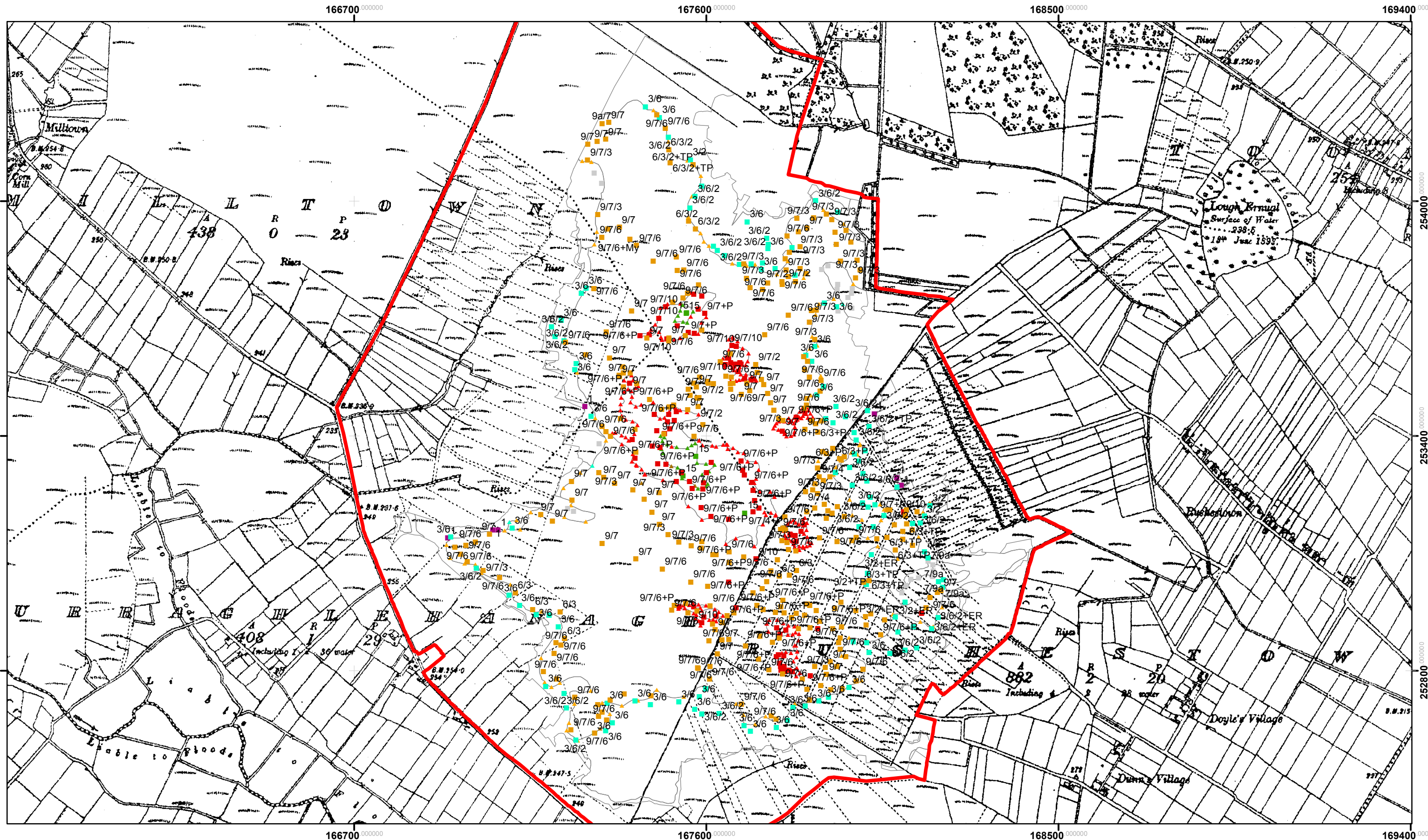
1:9,000

0 115 230 460 690 920 Meters



Legend

■ Quadrat	▨ Active Flush	▨ Face bank
Ecotope type	▨ Sub-marginal	▨ Open water
▨ Central	▨ Marginal	▨ Conifer plantation
▨ Sub-central	▨ Inactive Flush	▨ Clear felled area
▨ Bog Woodland	▨ Woodland	▨ SAC



Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

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Curraghlehanagh SAC (002350) Co. Galway

1:9,000

0 125 250 500 750 1,000 Meters



Legend

Ecotope type

- Central ecotope complex
- Sub-central ecotope complex
- Sub-marginal ecotope complex
- Marginal ecotope complex
- Face bank ecotope complex

Boundary type

- SC/C
- F/C
- SM/C
- M/C

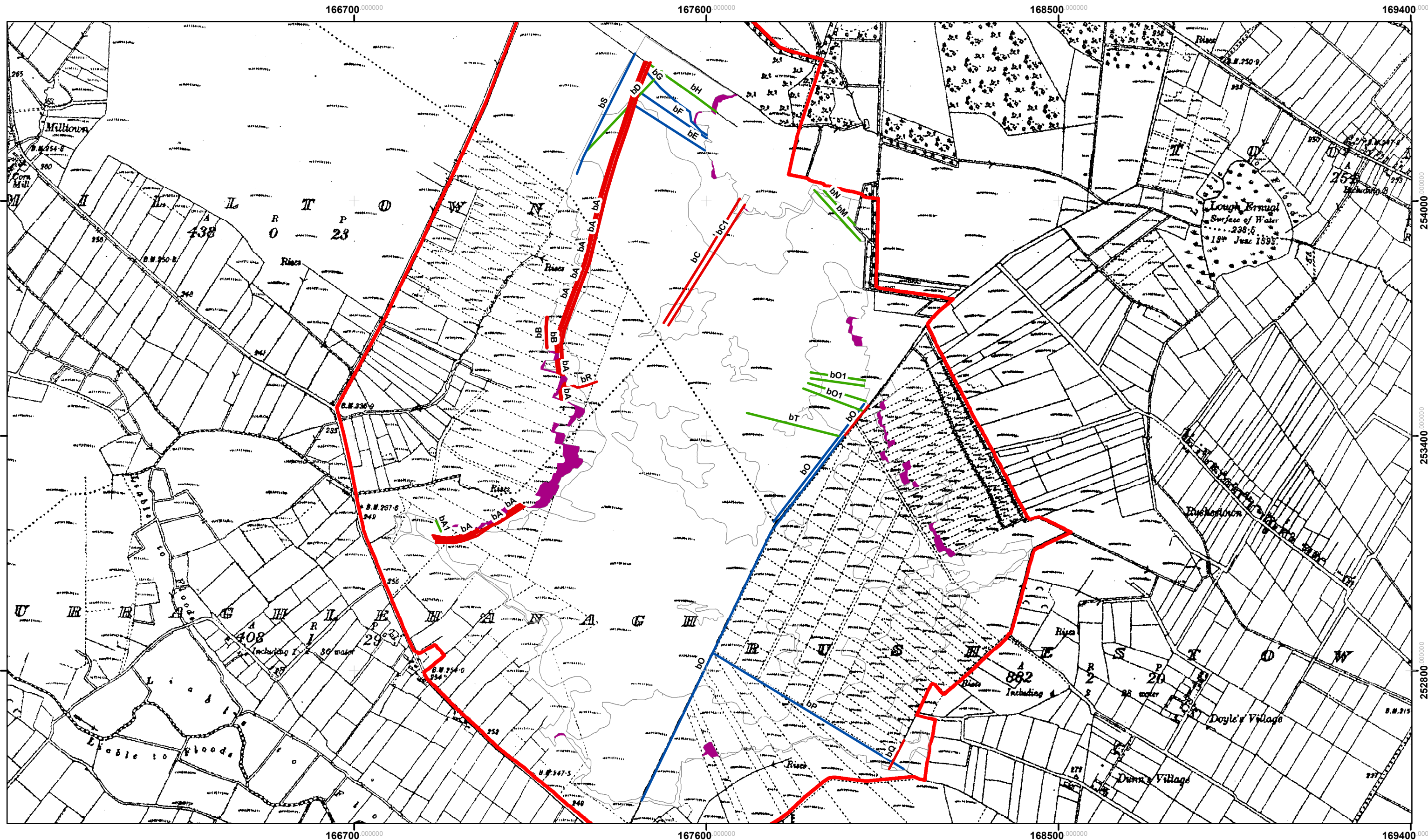
Ecotope type

- F/SC
- SM/SC
- M/SC
- FB/SC
- F/SM
- M/SM

Ecotope type

- SM/FB
- F/M
- M/FB
- F/FB
- Other





Raised Bog Monitoring & Assessment Survey 2013
Map 3: Impacts (High bog drainage; Turf cutting; Fire events)

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Curraghlehanagh SAC (002350)
Co. Galway

1:9,000

0 125 250 500 750 1,000 Meters



Legend

- | | | |
|-----------------------------|---------------------------------|-----|
| High Bog drainage | Not blocked: functional | SAC |
| Blocked: non-functional | Not blocked: non-functional | |
| Blocked: reduced functional | Not blocked: reduced functional | |
| | Burnt high bog (2004/05-12/13) | |
| | High bog cutaway (2004/05-10) | |