Cloonchambers Bog (SAC 000600), Co. Roscommon

Executive Summary

This survey, carried out in November 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Cloonchambers 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 covers 7.66ha (3.91%) of the high bog area. There is no central ecotope present on site, although it was previously found as reported in 1994 by Kelly *et al*. (1995), and sub-central ecotope was mapped at eight locations. These areas are mostly characterised by well-developed microtopography with interconnecting pools supporting healthy *Sphagnum cuspidatum*. Two small areas of active flush are also present. A small patch of *Sphagnum pulchrum* was found in an area of Active Raised Bog in the south-west of the site. This species, which has a restricted distribution on raised bogs, had not been recorded in previous surveys and was not recorded anywhere else on the site during the 2012 survey.

Degraded Raised Bog covers 188.11ha (96.09%) of the high bog area. It is drier than Active Raised Bog and supports a lower density of *Sphagnum* mosses. It has a less developed micro-topography while permanent pools and *Sphagnum* lawns are generally absent. Several inactive flushes are present, including one large *Molinia*-dominated flush that separates the main lobe of the bog from two southern lobes. Four glacial till mounds covered by a thin layer of peat and dominated by tall, leggy *Calluna* occur in the main lobe of the bog. Two of the mounds also support *Quercus petraea* scrub.

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. In Active Raised Bog, Rhynchosporion vegetation occurred mainly within *Sphagnum* hollows

and lawns and along *Sphagnum* pool edges. In Degraded Raised Bog, Rhynchosporion vegetation occurred mainly in wet flats of *R. alba* and *Narthecium ossifragum*.

No restoration works have taken place at the site to date.

The current conservation objective for Cloonchambers 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 85.55ha. 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 or degradation of any kind occurs. Although FRVs could not be established for the Rhynchosporion depressions, the objectives are to increase its extent and improve 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.

Although a simple comparison between the original 1994 Active Raised Bog value and 2012 figures indicate an increase in the habitat's extent (from 3.8ha to 7.66ha), on detailed consideration it is not considered that there has in fact been a significant real increase in ARB habitat at the site in the 2004 to 2012 period. It is also probable that the original extent of Active Raised Bog in 1994 would have been close to the 2012 value (7.66ha) or possibly even higher. Some new peat forming areas have been described, and the boundaries of previously mapped areas have been amended (e.g. **Sc1**), but these are generally considered to be the result of more comprehensive field mapping and re-interpretation of vegetation rather than actual changes. The apparent increase in Active Raised Bog within Sc1 may however be due to recovery from fire events or subsidence leading to the formation of a partially enclosed depression on the bog surface. Subsidence on the high bog can occasionally lead to localised rewetting of the surface and the development of Active Raised Bog. This type of Active Raised Bog development associated with subsidence has been seen to occur locally at Clara Bog. These localised depressions were associated with increased water losses through the base of the bog due to drainage and/or turf cutting in marginal areas which drain more permeable layers under the bog. The creation of such enclosed hollows will usually result in steeper slopes and increased drying out in the surrounding high bog area. Such changes, although they may locally favour Active Raised Bog, can cause irreversible long terms changes in the

topography/hydrology of the bog. The subsidence at Clara was associated with the development of dry ridges and mounds in the bog. Such mounds are also quite extensive across Cloonchambers Bog and in particular in the vicinity of **Sc1** indicating the presence of widespread subsidence, even at significant distance from the bog margins. It is not clear whether these subsidences are still occurring and if so whether they will eventually dry out the areas that are currently wet. In contrast to the original survey in 1995 and the next monitoring round in 2004, no fire events have been reported in the 2004-13 period. As a result, an increase in Active Raised Bog after recovery from frequent fire events is also considered to be a possible reason for some of the apparent variation in Active Raised Bog.

In addition, some of the apparent increase in Active Raised Bog is due to the recognition that areas previously considered as cutover were actually part of the high bog. Natural regeneration of peat-forming habitats has been noted at several locations around the margins of Cloonchambers Bog where there has been shallow cutting or Difco cutting. Active Raised Bog has developed at **Sc5** and flush **ZZ**, which supports *Sphagnum* cover in excess of 90%. This area was already reported by Kelly *et al*. (1995) and during the 2004 survey (Fernandez *et al*. 2005) as regenerating cutover but is now mapped as part of the high bog. This type of shallow cutting can form depressions on the high bog surface which rewet when the drains associated with them become blocked. This situation allowed active peat forming vegetation to develop locally leading to Active Raised Bog once cutting and drainage activities have ceased. However, it takes decades for this vegetation type to be formed. For example, Kelly *et al*. (1995) already described these areas as regenerating cutovers, as mentioned above. The current type of cutting, Hopper cutting, at Cloonchambers, where machinery digs much deeper will not lead to this type of situation.

Subsidence and certain types of cutting may in particular limited circumstances lead to the development of Active Raised Bog. Where cutting is involved it is expected that it will take decades for the Active Raised Bog to develop. However, this will in most cases be on a relatively small scale and usually caused long term irreversible impacts on other parts of the bog. In the case of subsidence if the process continues, the long term outcome is likely to be the loss of the wet areas originally created by this process.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area and quality have remained unchanged in the reporting period. However, the current Area and S&Fs values are significantly below favourable reference values. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) continue to threaten the habitat.

Peat cutting and drainage on the high bog and adjacent to the high bog are the most threatening current activities at the site. At least 1.86ha of high bog have been lost in the reporting period due to peat cutting. 1.9 km of drains remain functional and another 1.9 km are reduced functional. Well-maintained drains exist on cutover bog, and some significant agricultural drains are present on farmland adjacent to the site, especially to the south of the high bog. Active Raised Bog conservation status assessment has indicated that peat cutting had a low impact on Active Raised Bog in the 2004-2012 period in Cloonchambers Bog. This is because most of the activity takes place either in lobes where Active Raised Bog is absent or far away from the current small area of Active Raised Bog habitat. However, if drainage and cutting is still causing subsidence, this will lead to long term irreversible impacts on the hydrology and ecology of the bog and more and more of the bog will be affected. In addition, peat cutting along with drainage is deemed to impact on the Future Prospects of Active Raised Bog on the site as it prevents restoration works and impacts on the potential to restore Degraded Raised Bog 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 **Cloonchambers SAC** has been given an **Unfavourable Bad-Declining** assessment.

A series of **recommendations** have been also given, these include: cessation of peat cutting; further hydrological and topographical studies to ascertain more accurate FRVs; detailed hydrological studies to identify suitable restoration measures and potential for off-site impacts from restoration works; research on the potential for natural and assisted regeneration of peat-forming systems on cutover bog; restoration works on the high bog and cutover areas; and further botanical monitoring surveys.

Site identification

SAC Site Code	000600	**6" Sheet:**	RN 26
Grid Reference:	E 162700 / N 280300	**1:50,000 Sheet:**	32, 39
High Bog area (ha):	195.77ha [1]		
Dates of Visit:	05 to 08/10/12		
Townlands:	Cloonchambers, Cloonconra, Leveelick and Cloonkeen.		

[1] The current extent of the high bog is 195.77ha, while that reported in 2004 was 192.18ha (Fernandez *et al*., 2005). This discrepancy is 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, rather than any actual increase in high bog extent. In addition, a high bog area already within the SAC in 2004, which is located to the west of the site, is now mapped and reported as part of the site's high bog. High bog area has in fact decreased in the 2004-2012 period due to peat cutting. The actual high bog extent in 2004 was 197.63ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Cloonchambers Bog lies approximately 2 km west of Castlerea, Co. Roscommon. The River Suck runs to the north of the bog and approaches close to the edge of the southwest lobe (Lobe 5) of the high bog. The Athlone to Westport railway line runs to the south of the site and forms the southern boundary of Lobe 2 (see Fernandez *et al*. 2005) in the south-eastern part of the high bog.

The site may be accessed the north and from the south-east by minor and bog roads and crossing cutover bog.

Description of the survey

The survey was carried out in November 2012 and involved a vegetation survey of the high bog at Cloonchambers 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 photographical 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 Cloonchambers Bog was re-surveyed. Sections mapped as sub-marginal and sub-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 and additional quadrats were recorded where necessary (see Appendix III). 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

Cloonchambers Bog has been classified as a medium sized Western/Intermediate Raised Bog (Cross 1990) and geomorphologically as a Ridge Basin bog type (Kelly *et al.*, 1995). Cloonchambers Bog has a complex irregular shape. It is separated into four lobes and is elongated in an east-west direction, being approximately 3 km long and 1.25 km wide at its widest point (Map 1). The main lobe (Lobe 1) lies to the north along the crest of a drumlin. The southern lobes (Lobes 4 & 5) are separated from the main lobe (Lobe 1) by a *Molinia*-dominated flush (Y), which occurs in a central depression. The south-western lobe (Lobe 5) is in turn separated from the southern lobe (Lobe 4) by a deep drain and another depression occupied by a *Molinia*-dominated flush. The south-eastern lobe (Lobe 2 - south-eastern section of main high bog) is separated from the main lobe by a flush (ZZ). A remnant eastern fragment (Lobe 3) of high bog is separated from Lobes 1 and 2 by cutover bog. There is another area (5.6ha) of what appears to be high bog within the SAC boundary to the northeast of Lobe 3 (E 164550 / N 280100); this area has not been surveyed to date, and the presence of high bog habitats in this area requires confirmation.

Ecological Information

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

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

- Active Raised Bog (EU code 7110),
- Degraded Raised Bog (EU code 7120), and
- Depressions on peat substrates of the Rhynchosporion (EU code 7150).

Active Raised Bog (7110)

The current area of Active Raised Bog at Cloonchambers Bog following comprehensive mapping is 7.66ha (3.91% of the high bog).

Table 8.1 indicates an apparent increase in habitat extent in the 1994 to 2004 period: 3.48ha recorded in 1994 against 7.66ha reported in 2004 (amended value). A more detail analysis of each individual area of Active Raised Bog reported in 2012 (see Table 8.2) indicates most of them would have been already present in 1994 as they consist of well established Active Raised Bog vegetation. Therefore, the variation in habitat extent would be mainly due to more comprehensive surveying in 2012 which resulted in more accurate mapping. The only exceptions would be areas **Sc1**, **Sc5** and flush **ZZ**. Some real expansion of ARB at **Sc1** cannot be ruled out, as this now covers 1.3ha compared to the 0.1ha reported in 2004 by Fernandez *et al*. (2005). This change may be due to recovery from previous fire events such as those reported prior to the 2004 survey by Fernandez *et al*. (2005) or associated with potential subsidence (see Area section under Active Raised Bog assessment). This area of ARB was apparently present in 1980's, as an area of active bog was described for that general area by Douglas and Mooney (1984). Newly recorded **Sc5** and flush **ZZ** correspond with areas where shallow Difco or possibly scraw cutting took place in the past. These areas were reported by Kelly *et al*. (1995) and Fernandez *et al*. (2005) previously, however they were reported as regenerating cutover rather than Active Raised Bog on the high bog. On the other hand, Fernandez *et al*. (2005) also reported Active Raised Bog habitat quality declines in the western section of the site where **Sc4** declined from central to subcentral ecotope.

In summary the short term (2004-2012) analysis indicates that there has been no real change in the habitat's extent in this period (see 2004 (amended) figures in Table 8.1, note under table 8.1 and Table 8.2) and any apparent variation is due to recalculation of 2004 area estimates following the more comprehensive surveying and accurate mapping in 2012. It is also probable that the original

extent of Active Raised Bog in 1994 would have been close to the 2012 value (7.66ha) or possibly even higher.

According to this project's survey Active Raised Bog currently consists only of sub-central ecotope and active flushes.

Sub-central ecotope was found at eight locations (**Sc1** to **Sc8**) (see Appendix IV, Map 1). The wettest community complex recorded was 10/4, which occurred in a newly mapped sub-central area (**Sc5**) in an area of high bog where shallow surface cutting or Difco cutting has taken place in the past. *Sphagnum* cover exceeded 90%, which was composed mainly of lawns of *S. papillosum* in addition to *S. cuspidatum* pools and hollows and some low *S. capillifolium* hummocks. Complex 6/35 was mainly recorded in **Sc2** and **Sc3** in Lobe 1 and was characterised by well-developed microtopography with 11 to 25% cover of interconnecting pools. Many pools were steep sided whereas others supported good cover of *S. cuspidatum*. Interpool areas were dominated by *Narthecium ossifragum* flats, and the western raised bog species *Campylopus atrovirens, Pleurozia purpurea* and *Racomitrium lanuginosum* were frequent. Complex 6/4+P was the typical community complex in the western part of Lobe 1 (**Sc1** and **Sc6**). It was distinguished from 6/35 by higher cover of *Rhynchospora alba* and *Sphagnum*, particularly *S. cuspidatum* in hollows and pools, and a notable abundance of *S. fuscum* (4-10%). Sub-central areas in Lobe 5 were typically complex 9/7+P, which was characterised by firm interpool areas dominated by *Calluna, Eriophorum vaginatum* and *Trichophorum germanicum*. Tall *Racomitrium lanuginosum* hummocks were a feature of some pools, and one lone patch of *Sphagnum pulchrum* was found in **Sc4** in this complex (E 161689 / N 280234).

A small patch of flush **Y** was actively peat forming. *Molinia* was dominant and *Myrica gale* was abundant. Large hummocks of *Sphagnum palustre* were present, reaching up to 40cm high in places. Localised patches of *Juncus subnodulosus* were notable and indicative of a more base-rich groundwater influence. A small section of flush **ZZ** was likewise active. This area was on former shallow cutting on the high bog and was essentially a flushed variant of sub-central 10/4 vegetation with higher vascular plant cover, especially *Eriophorum vaginatum*. Scattered *Molinia caerulea* was also present.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Cloonchambers Bog is 188.11ha (96.09% of the high bog).

Degraded Raised Bog includes sub-marginal, marginal and face bank ecotopes, as well as inactive flushes and four mineral mounds. 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 Degraded Raised Bog. The highest quality sub-marginal community complex was 6/2+Cl, an unusual complex characterised by very abundant (34-50% cover) *Cladonia portentosa* and frequent *Andromeda polifolia*. *Calluna* cover was very sparse (<4%), and the ground was soft to quaking with 26-33% cover of *Sphagnum capillifolium, S. papillosum* and other *Sphagna.* This complex was found in parts of Lobe 4, as was complex 7/6/4, another relatively wet sub-marginal type. Pools with *S. cuspidatum* were occasional to frequent in this complex, and *Rhynchospora alba* and *Narthecium ossifragum* flats are prevalent. Complex 9/7 was scattered across Lobe 1 and in the northeast of Lobe 4. This complex was dominated by tall *Calluna* and *Eriophorum vaginatum* with 11 to 25% cover of *Sphagnum capillifolium*. The most frequent and widespread sub-marginal complex on the site was also the poorest in quality: complex 9/7/6. *Sphagnum* cover was variable, averaging 11 to 25%; *S. capillifolium* was the main species, but *S. cuspidatum* was also frequent in hollows and occasional relict pools. Where *Sphagnum* cover was low, *Narthecium* flats were more abundant, and the complex graded into marginal 3/6 or 3/6/2.

Marginal ecotope was drier than sub-marginal ecotope and mainly occurred as a narrow band near the margins of the high bog. The most common and widespread marginal complex was 3/6, which was dominated by *Narthecium ossifragum* and *Carex panicea* flats with low cover of *Sphagnum* (4-10%). Other marginal complexes were present (see Appendix I), most notably 7/2, which was found mainly on the steep slopes north of flush **Y**. Here, the ground was dissected with natural water flow channels occupied by flush vegetation with *Eriophorum vaginatum*, *Calluna vulgaris*, *Molinia caerulea* and 50+% cover of *Sphagnum*. Between channels were hard ridges dominated by *Calluna, Trichophorum germanicum* and *E. vaginatum.*

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography.

The high bog also features several inactive flushes (**A, B, C, D, E, V, W, X, Y, Y1, Y2, YY, Z** and **ZZ**). Most were dominated by *Molinia caerulea* with some *Myrica gale* and were situated towards the edge of the high bog. Flush **Y** was by far the largest, and it separated Lobe 1 from the southern Lobes 4 and 5. It was quite dry and the *Molinia* was not particularly tussock-forming. Flush **ZZ** was wetter and more tussocky and was located in a depression separating Lobes 1 and 2. Flushes **C** and **X** separated Lobes 4 and 5. Flush **C** was formerly mapped as grassland (in 1994 and 2004), but in the absence of grazing, the vegetation has reverted to *Molinia* and *Myrica* dominated flush, with only

occasional patches of *Juncus effusus*. The contiguous flush **X** graded from *Molinia* dominance to *Phragmites* dominance from east (adjacent to **C**) to west (adjoining high bog).

Four mounds (**M1-M4**) are raised above the surface of the high bog. They are covered by a thin layer of peat and are likely to be composed of glacial till (Kelly *et al.*, 1995). These have been mapped as face bank ecotope as they were dominated by tall, leggy *Calluna*. In addition to heather, dwarfed, multi-stemmed *Quercus petraea* trees/shrubs were abundant on **M1** and occasional on **M2**, along with *Salix aurita*. *Molinia caerulea* and *Hypnum jutlandicum* were found scattered on each of the mounds, which were generally species-poor, with the exception of **M1**; the latter mound also supported *Vaccinium myrtillus, V. vitis-idaea, Pteridium aquilinum, Luzula sylvatica, Rubus fruticosus, Hedera helix* and *Sorbus aucuparia*.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation was widespread on Cloonchambers Bog. It was found in both Active and Degraded Raised Bog, but tended to be best developed and most stable in the wettest areas of Active Raised Bog and the wettest sub-marginal community complexes in Degraded Raised Bog. In Active Raised Bog, the Rhynchosporion vegetation occurred within *Sphagnum* hollows and lawns and along *Sphagnum* pool edges. Typical plant species in these communities included *Rhynchospora alba, Erica tetralix, Eriophorum vaginatum, Sphagnum papillosum* and *S. cuspidatum*. In Degraded Raised Bog, Rhynchosporion vegetation occurred mainly in wet flats of *R. alba* and *Narthecium ossifragum*. Well-developed Rhynchosporion vegetation also occurred in localised patches on wet flats, in erosion channels and at the edges of tear pools within marginal ecotope (complex 3/6/4).

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Cloonchambers 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 Cloonchambers 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	1.86ha of the high bog cut away	Inside High Bog: 37 different locations around high bog	**7120**
C01.03	Peat extraction	L	-1	1.86ha of the high bog cut away	Inside High Bog: 37 different locations around high bog	**7110/7150**
J02.07	Drainage	M	-1	3.835 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 [2]	Inside High Bog	**7110/7120/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	19ha	Outside 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 is estimated and represents the extent of invasive species across entire high bog

n/av: not available

Peat cutting

This activity has taken place at 37 locations (See map 3) in the 2004-2010 period. In the west - two locations (plots) within Lobe 1 (northern section of main high bog), southwest - one location within Lobe 5 (western section of main high bog) and 4 locations within Lobe 4 (southern section of main high bog section), north - four locations within Lobe 1). In the east - eleven locations within Lobe 2 (south-eastern section of main high bog) and 15 locations within Lobe 3 (eastern isolated lobe)). This has reduced the area of high bog by 1.86ha. Cutting is particularly intense within Lobe 3 where Active Raised Bog habitat is no longer present. 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 19 plots were cut on Cloonchambers Bog in 2010/2011, 16 plots were cut in 2012 and 10 in 2013. During the 2012 field survey, the majority of recent peat cutting appeared to be concentrated in the east of the site around Lobes 2 and 3. Thus, the area of high bog lost on

Cloonchambers Bog during the reporting period is in excess of 1.86 ha, but since there is no aerial photography available post 2010, the area lost from 2010 to 2013 cannot be estimated.

From a more historical perspective the high bog area has decreased from an original area of approximately 520ha to 195ha in 2012 and thus only 38% of the original high bog remains. The original bog has been cut away from all directions as a result of domestic peat cutting. Thus, turf cutting and associated activities have reduced considerably the high bog at the site and as a result Active Raised Bog extent, as indicated by the small percentage (3.93%) of Active Raised Bog at the site.

Kelly *et al*. (1995) reported Difco, Hopper and old hand cutting at the site. Difco-cutting on the high bog has been relatively extensive at this site compared to other bogs, with different plots abandoned at various stages.

Fernandez *et al*. (2005) described natural regeneration of peat-forming habitats on the high bog where there has been shallow cutting (scraw) or Difco cutting at several locations such as **Sc5** and **FZZ**. This type of shallow cutting can form depressions on the bog surface which rewet when the drains become blocked. This situation allowed active peat forming vegetation to develop locally leading to Active Raised Bog once cutting and drainage activities have ceased. However, it takes decades for this vegetation type to be formed. For example, Kelly *et al*. (1995) already described these areas as regenerating cutovers. The current type of cutting hopper cutting at Cloonchambers, where machinery digs much deeper will not lead to this type of situation.

Most recent peat cutting appears to have been carried out using the hopper method, which has left very high face banks around Lobe 3, the east side of Lobe 2 and the south sides of Lobes 4 and 5.

An area recently disturbed by turf-spreading was noted in the northern part of Lobe 1 near flush **W**.

Peat cutting is considered to have a high importance/impact on Degraded Raised Bog and a low importance/impact on other high bog habitats including Active Raised Bog in the 2004-2012 reporting period. The reason for this distinction is that there appears to have been no recent loss of Active Raised Bog area, although past impacts were doubtlessly significant and future impacts remain likely. Most of the activity takes place either in lobes where Active Raised Bog is absent or far away from the current small area of Active Raised Bog habitat. The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of Active Raised Bog towards FRVs as restoration works cannot be employed until such activities stop and future losses cannot be ruled out. 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 Active Raised Bog covers only a very small area (7.66ha or 3.91% of the high bog) and is 91.05% below the FRV target. In addition,

old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats.

Drainage

High bog drainage

Table 6.2 shows a decrease in the length of functional drains on site as the result of 75 m of drains being lost to peat cutting and 158 m of drains becoming reduced functional. In addition, 25 m of reduced functional drains and 100 m of non-functional drains have been lost to peat cutting. The majority of drains in the high bog remain functional (1.935 km). 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.

Drain complex bC appeared to have been recently maintained during the 2012 field survey; Fernandez *et al.* (2005) also noted A significant amount of water exits the bog through drain bB; this channel is likely to be of partly natural origin, but has almost certainly been artificially cleaned and deepened in the past.

High bog drainage is considered to have medium importance/impact on high bog habitats. As Fernandez *et al.* (2005) note, there are relatively few drains on the high bog surface, apart from drain bB and complex bC.

No blockage of drains has occurred to date.

Table 6.2 High bog drainage summary

Status	2004 (km) [1]	2012 (km)	Change
NB: functional	2.093	1.935	(-)0.233
NB: reduced functional	1.742	1.900	(+)0.133
NB: non- functional	1.998	1.898	(-)0.100
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.000	0.000

B: Blocked; NB: Not blocked n/a: not applicable

[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 detail description of the drainage present on the high bog at Cloonchambers 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	0.236	NB: non-functional	NB: non- functional	No	
bB	0.504	NB: functional	NB: functional	No	Drain section wrongly classified as reduced functional in 2004; water flowing recorded during visit
bB	0.476	NB: reduced functional	NB: reduced functional	No	
bC	0.450	NB: functional	NB: functional	No	Recently maintained
bC1	0.209	NB: functional	NB: functional	No	Recently maintained
bC3	0.083	NB: functional	NB: functional	No	Recently maintained
bD	0.016	NB: reduced functional	NB: reduced functional	No	
bE	0.178	NB: reduced functional	NB: reduced functional	No	
bF	0.376	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004
bH	0.174	NB: reduced functional	NB: reduced functional	No	
bJ	0.063	NB: functional	NB: functional	No	
bJ1	0.018	NB: functional	NB: functional	No	
bJ2	0.228	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as non-functional in 2004
bK	0.038	NB: functional	NB: functional	No	
bM	0.215	NB: functional	NB: functional	No	
bN	0.158	NB: functional	NB: reduced functional	Yes	
bO	0.108	NB: reduced functional	NB: reduced functional	No	
bP	0.076	NB: functional	NB: functional	No	
bR	0.175	NB: non-functional	NB: non- functional	No	
D	0.061	NB: non-functional	NB: non- functional	No	
E	0.419	NB: non-functional	NB: non- functional	No	
F	0.245	NB: functional	NB: functional	No	Partially within cutover
G	0.116	NB: non-functional	NB: non- functional	No	
H	0.171	NB: non-	NB: non- functional	No	

Drain Name	Length (km)	2004 status	2012 status	Change	Comment
		functional			
I	0.353	NB: non-functional	NB: non- functional	No	
J	0.186	NB: reduced functional	NB: reduced functional	No	Water flowing recorded during visit
K	0.162	NB: non-functional	NB: non- functional	No	
M	0.205	NB: non-functional	NB: non- functional	No	
mD2	0.034	NB: functional	NB: functional	No	

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. These drains continue to drain the high bog and impacting on high bog habitats.

Drainage maintenance is evident on the 2010 aerial photograph in cutover areas.

There are two significant agricultural drains to the west and south that were maintained prior to 2004, although no more recent maintenance was evident on 2010 aerial photography. The River Suck flows to the north of the site and runs adjacent to the northwest edge of Lobe 5. The river may have been subject to arterial drainage maintenance; however, there is no information available about this.

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

Fire history

Fernandez *et al*. (2005) noted the frequent occurrence of burning at the site. A large fire event damaged approximately 45ha in the north-eastern section of high bog (parts of Lobe 1 and 3 and Lobe 2) in 2003-4. The vegetation in these parts of the bog still showed the effects of this fire in 2012 (e.g. greater abundance of *Trichophorum germanicum*). No fire events have been reported on the high bog in the 2004-2012 reporting period.

Invasive species

Eleven *Pinus contorta* saplings were recorded at four locations in Lobes 1, 4 and 5 in the western part of the site. None of the trees was more than 2 m tall. A 50 cm tall *Picea sitchensis* sapling (as well as

a 1.8 m tall *Betula pubescens* sapling) was also found with two of the *Pinus* saplings in Lobe 5. The non-native moss *Campylopus introflexus* was noted colonising bare peat in marginal ecotope throughout the site. A *Rhododendron ponticum* bush was recorded in 2004 northwest of Mound 1; this was not re-found in 2012.

There is no evidence of significant spread of invasive species since the 2004 survey.

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

Afforestation and forestry management

There are three conifer plantations totalling 19ha in the vicinity of Lobe 3. One plantation is within 60m of high bog on Lobe 3, and the other two are adjacent to another potential high bog section within the SAC that has not been surveyed to date. All three conifer plantations are outside the SAC.

Forestry plantations and associated drainage are considered to have low importance/impact on Degraded Raised Bog. As forestry plantations occur only in the vicinity of Lobe 3, which does not support Active Raised Bog or significant amounts of Rhynchosporion vegetation, impacts on these habitats are not considered significant.

Other impacting activities

No other significant impacting activities were noted or recorded in 2012 impacting high bog habitats in the 2005-2012 reporting period.

Conservation activities

No physical management actions, such as the blocking of drains, have been carried out to improve the conservation status of the high bog habitats.

NPWS have bought out turbary rights and ownership rights of various turf-cutting plots around the bog, and this is likely to have reduced the amount of turf cutting taking place at Cloonchambers Bog.

Natural regeneration of peat-forming habitats in areas of high bog, where shallow surface cutting or Difco cutting has taken place in the past, was observed at several locations around the margins of Cloonchambers Bog. These areas highlight the potential for proactive conservation works to promote restoration Active Raised Bog on suitable cutover. Regenerating cutover areas observed in

the field or on 2010 aerial photography include the area of difco-cut high bog newly mapped as **Sc5**; southeast of Lobe 2 adjacent to **Sc5** (E 163705 / N 279794); south of lobe 2 (E 163027 / N 280162); two locations to the southwest of lobe 2 (E 161873 / N 279900 and E 162032 / N 279804); and two locations to the north of lobe 3 (E 164096 / N 280093 and E 164293 / N 280022).

Conservation status assessment

The assessment of the conservation status of Annex I Active and Degraded Raised Bog and Bog Woodland 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 that there have been no real changes in the area of Active Raised Bog in the reporting period (2004-2012). Despite this, several changes have been made to Active Raised Bog areas as a result of more comprehensive surveying and mapping and changes in interpretation of the vegetation.

Changes have been made to the boundaries of sub-central ecotope areas **Sc1, Sc2, Sc3** and **Sc4** and to the active part of flush **Y** due to more comprehensive surveying in 2012, which resulted in more

accurate mapping. **Sc1** and **Sc3** have been expanded, whereas **Sc2**, **Sc4** and **Y** have been reduced in size.

It is possible that the expansion of **Sc1** is a real change. However, this area was already noted by Douglas and Mooney (1984) as being soft and wet with abundant *Eriophorum angustifolium* cover and long tear pools. Thus, indicating the possibility of Active Raised Bog within it. Kelly *et al*. (1995) described this area as sub-marginal ecotope (complex 9/7) and gave the following description: "This complex, dominated by *E. angustifolium*, *E. vaginatum* and *Calluna*, is seen in a line leading from the N side of mound 1 and is associated with a small *Calluna* ridge attached to the mound. The *Sphagnum* cover is moderate and includes *S. cuspidatum* and *S. capillifolium*. Some past burning has occurred as old *Calluna* stems are present. *Juncus effusus* and *Aulacomnium* occur suggesting some enrichment." Thus, indicating that the area already supported wet vegetation. Based on our current definitions this description could cover either sub-marginal or sub-central ecotopes but we cannot be clear without more information on the *Sphagnum* cover at the time. **Sc1** was newly mapped in 2004 and was considered to have improved in quality since the 1994 survey. This area was described by Fernandez *et al*. (2004) as flushed and recently burned in 2004, which indicates that the area may have recovered from burning effects since 2004. Fire can result in significant decreases in *Sphagnum* cover. It is also possible that there has been actual increase in the extent of area of wet vegetation also due to subsidence leading to the formation of a partially enclosed depression on the bog surface. This would have led to localised rewetting of the surface and the development of Active Raised Bog. This type of Active Raised Bog development associated with subsidence has been seen to occur locally at Clara Bog. These localised depressions are usually associated with increased water losses through the base of the bog associated with drainage and/or turf cutting in marginal areas which drain more permeable layers under the bog. The creation of such enclosed hollows will usually result in steeper slopes and increased drying out in the surrounding high bog area. Such changes, although they may locally favour Active Raised Bog, can cause irreversible long terms changes in the topography/hydrology of the bog. The subsidence in the area is indicated by the presence of dry ridges and mounds developing in the bog. Such mounds are quite extensive across Cloonchambers Bog indicating the presence of widespread subsidence, even at significant distance from the bog margins. Nevertheless, there is insufficient information to make a definitive decision that this represents an actual increase in the 2004-2012 period.

Sc5 is a newly mapped area of sub-central ecotope that has developed on shallow cutting or Difco-cutting on the high bog. This area was surveyed in 2004 and described (but not mapped) as regenerating cutover under Degraded Raised Bog habitat type, despite observations that "some areas are quite wet and the *Sphagnum* cover is up to 50%, dominated by *S. cuspidatum* in the shallow

channels and *S. papillosum* and *S. capillifolium* in the low ridges.", thus indicating peat forming conditions. In addition, Fernandez *et al*. (2005) also reported "some regenerating cutover dominated by *Eriophorum angustifolium* and *Eriophorum vaginatum* with *Sphagnum* cover up to 60% in old abandoned plots along the southern high bog boundary of lobe 1". Kelly *et al*. (1995) already described regenerating cut-away areas in this section of the site, thus indicating that turf cutting had not occurred for long period of time and that peat forming habitat may have been already present prior to the 1995 survey. Although *Sphagnum* cover in 2012 appeared higher (>90%), probably due to recovery from fire prior to the 2004 survey, describing this sub-central ecotope area as newly developed since 2004 would be misleading. The active part of flush **ZZ** was also located in the same area of regenerating cutover and is also newly mapped as a result of changes in interpretation of the vegetation.

Three new sub-central ecotope in areas (**Sc6**, **Sc7**&**Sc8**) have been recorded in 2012. The vegetation description indicates for these areas are well established vegetation types and thus the identification of these areas is likely to be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.

As table 8.1 below illustrates the extent of Active Raised Bog apparently increased by 0.37ha in the 1994 to 2004 reporting period (based on the original 2004 value). However this is largely due to mapping and surveying differences between the two surveys. Only 0.1ha, which correspond with **Sc1**, within the 0.37ha was identified as a potential real increase in 2004, and thus the actual extent of Active Raised Bog in 1994 could have been at least 3.75ha, as already mentioned by Fernandez *et al*. (2005). On the other hand, Fernandez *et al*. (2005) also reported a decline in Active Raised Bog habitat quality in the 1994-2004 period with one Active Raised Bog area to the west of the site mapped as central ecotope (best habitat quality type) in 1995 being sub-central ecotope in 2004 (**Sc4**). Hence, indicating that losses in Active Raised bog in the 1994-2004 period cannot be ruled out. The new 2012 survey has amended the 2004 habitat extent to 7.66ha. This amendment is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping and vegetation re-interpretation (see Table 8.2). Thus, no variation in the habitat extent is considered to have taken place in the 2004-2012 period. To summarise, taken into account the previous the actual extent of Active Raised Bog in 1994 was likely to be closer to the 2012 value. Nevertheless, slight increases in habitat extent along the east in the 1994-2004 within **Sc1** associated with recovery from burning or associated with subsidence and **Sc5** with formerly classified as regenerating cutover areas, or a decrease in habitat extent along the west (**Sc4**) cannot be ruled out.

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 85.55ha (based on 1994 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. In the case of Cloonchambers Bog, the current FRV is likely to be greater than the actual potential of the site to support Active Raised Bog, as the main lobe (Lobe 1) is situated on a drumlin ridge, resulting in a naturally thin peat layer and vegetation typical of marginal dry situations (Kelly *et al.*, 1995). The current habitat area value (7.66ha) is 91.05% below the FRV. A current Area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

Over the most recent reporting period (8 years; 2004-2012) there has been no change in the area of Active Raised Bog. Therefore, the habitat Area is given a **Stable** trend assessment.

The Area of Active Raised Bog at Cloonchambers 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 3.83ha (half of 7.66 ha, the current area of Active Raised Bog). The current value is 0.38ha (only active flush present) which is 90.08% below the FRV. Therefore S&Fs are given an **Unfavourable-Bad** assessment.

The long term (1994-2012) trend indicates a reduction in central ecotope (no longer present) and thus a decline in habitat S&Fs. The short term (8 years; 2004-2012) trends suggest that there has been no real change in the area of active flush and therefore the S&Fs are given a **Stable** trend.

Quadrats analysis (**Qsc1, Qsc2, Qsc3** and **Qsc4**) indicates the following:

Qsc1: shows some differences in total *Sphagnum* cover in 2012 (34-50%) when compared with 2004 (51-75%). These are largely due to lower estimated cover of *Sphagnum* hollows and covers of *S. cuspidatum, S. magellanicum* and *S. fuscum*. On the other hand, *S. papillosum*, *S. capillifolium* and *Calluna* were estimated to be significantly more abundant in 2012 than in 2004. These differences are most likely due to differences in quadrat recording methodology between surveys and positioning error in relocating the quadrat. *S. magellanicum* may have been over-recorded or recorded in error in 2004, as this species was found to be infrequent across Cloonchambers Bog in 2012.

Qsc2: differences between surveys are difficult to interpret, because in 2004 *Sphagnum* species appear to be under-recorded relative to the total *Sphagnum* cover reported and because of error in recording microtopography categories. Other variables are not radically different between surveys, and any differences are most likely due to differences in quadrat recording methodology between surveys and positioning error in relocating the quadrat.

Qsc3: shows significant differences in microtopography and some species composition. In 2012, low hummocks were estimated to be more abundant than in 2004 (51-75% compared with 4-10%), lawns were estimated to be lower in cover (<4% compared with 26-33%) and pools were considered to be less abundant (11-25% compared with 34-50%). Although total *Sphagnum* cover was estimated to be 34 to 50% in both years, *S. cuspidatum* was lower and *S. papillosum* and *S. capillifolium* were higher in 2012. *Calluna* cover was also estimated to be higher. These differences may reflect drying in this part of the bog, especially when it is considered that this area (**Sc4**) was recorded as being central ecotope in 1994. This result may reflect an ongoing decline, but due to differences in quadrat recording methodology between surveys and positioning error in relocating the quadrat, this is uncertain.

Qsc4: was newly recorded in **Sc1** in 2012 in order to gather data on Active Raised Bog in the eastern part of the site where there were no previous Active Raised Bog quadrats.

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

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

Future Prospects

The habitat Area and S&Fs have remained stable in the 2004-2012 reporting period. A number of activities continue to impact on the high bog, most notably peat cutting and marginal drainage. There are tentative indications that these factors may be affecting sub-central ecotope areas **Sc1** and **Sc4** in different ways. **Sc4** and **Sc6** appear to be the most vulnerable to change due to their locations near the high bog edge. Overall, however, the recent rate of change at Cloonchambers Bog appears to be slow. Nevertheless, if the current impacting activities continue to operate as at present, significant decreases/declines in the Area and S&Fs of Active Raised Bog are inevitable.

Habitat **Area** is currently 91.05% 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 90.08% 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).

Cutover areas will play a major role in the restoration of the habitat as the current characteristics of the high bog (i.e. naturally steep slopes and steep face banks caused by cutting and drainage) may make it difficult to regenerate previous Active Raised Bog values on the high bog. In fact, some in areas of high bog where shallow surface cutting or Difco cutting has taken place in the past (decades) have begun regenerating naturally in the last few decades, especially in the vicinity of Lobes 2 and 3. Regenerating cutover areas were already reported by Kelly *et al*. (1995). The extent and rate of natural regeneration of cutover requires further study.

Future Prospects would be improved by cessation of peat cutting and blocking of reduced-functional and functional drains on the high bog and cutover, following detailed hydrological studies.

The overall conservation status of Active Raised Bog at Cloonchambers 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	1.32	0.00	0.00	0.00	0.00	0.00
Sub-central	1.85	3.54	7.28	7.28	0.00	0.00
Active flush	0.31	0.31	0.38	0.38	0.00	0.00
Total	**3.48**	**3.85**	**7.66**	**7.66**	**0.00**	**0.00**

[1]These 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. More recent data gathered during the 2012 survey indicates that the actual extent of Active Raised Bog in 1994 would have been closer to the 2012 value, slight decreases and declines in the habitat extent in the 1994-2012 period cannot be ruled out.

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
Sc1	Qsc4	Stable (possibly increasing)	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. However, an increase due to recovery from burning or expansion associated with subsidence cannot be ruled out.	New quadrat in 2012.
Sc2	Qsc1	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Lower total *Sphagnum* cover in 2012 due to lower cover of *Sphagnum* hollows, *S. cuspidatum, S. magellanicum* and *S. fuscum*. Higher cover of *S. papillosum, S. capillifolium* and *Calluna* in 2012.
Sc3	Qsc2	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Minor differences in *Sphagnum* species cover and microtopography categories between survey years.
Sc4	Qsc3	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Higher abundance of low hummocks and lower abundance of lawns and pools in 2012. *S. cuspidatum* cover lower and *S. papillosum*, *S. capillifolium* and *Calluna* cover higher in 2012.
Sc5	None	Stable	This area was described as regenerating cutover, and thus peat forming) in 2004 but was incorrectly mapped as marginal ecotope. This regenerating cutover is now mapped as sub-central ecotope in 2012 due to changes in interpretation.	
Sc6	None	Unknown	This specific area was not surveyed in 2004. The identification of sub-central ecotope in this area may be the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc7	None	Unknown	As above.	
Sc8	None	Unknown	As above.	
Y	None	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
ZZ	None	Stable	This area was described as regenerating cutover and thus peat	

Area	Quadrats	Trend	Comment	Quadrats analysis
			forming in 2004 but was incorrectly mapped as marginal ecotope. This regenerating cutover is now mapped as active flush in 2012 due to changes in interpretation.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 110.22ha at Cloonchambers Bog. This value corresponds with the difference between the current high bog area (195.77ha) and the Active Raised Bog FRV (85.55ha) 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. The majority of the high bog (lobe 1) is situated on a drumlin ridge resulting in a naturally thin peat layer and vegetation typical of marginal dry situations (Kelly *et al.*, 1995). Therefore, the FRV for Active Raised Bog is likely to be greater than the actual potential of the site to support this habitat, as noted above, and the current FRV for Degraded Raised Bog at Cloonchambers Bog may be set too low. Detailed hydrological studies are required to set site-specific FRVs. At present, current habitat area is 70.67% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3 shows no real changes in the area of sub-marginal and face bank ecotopes. The area of marginal ecotope and inactive flush have decreased by 0.92ha and 0.94 ha, respectively, as a direct result of peat cutting. A number of other changes to the area of Degraded Raised Bog ecotope types have been made as a result of more comprehensive surveying leading to more accurate mapping. The most significant of these changes include increases in the area of inactive flush in lobes 2 and 3 and changes from marginal to sub-marginal ecotope in lobe 1 between mounds **M1** and **M2**. The latter changes are also due in part to interpretation and recovery from earlier fires; much of sub-marginal complex 9/7/6 in this area was of borderline quality.

Degraded Raised Bog area had decreased by 1.86ha (0.98% decrease in total) from 2004 to 2012, and therefore the habitat Area is given a **Decreasing** trend.

The Area of Degraded Raised Bog at Cloonchambers 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 47.03ha (25% of 188.11ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (60.96ha) is 29.63% 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.

Table 8.3 does not show any change in the area of face bank ecotope, however marginal has decreased by 0.92ha due to peat cutting. 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). Thus, the Degraded Raised Bog's S&Fs at Cloonchambers Bog are given a **Stable** trend.

The mapping of boundary between marginal and sub marginal is difficult and decreases are only recorded where major changes in the vegetation are evident. Therefore, where no changes are shown, more subtle negative effects cannot be ruled out, and therefore negative changes may have been underestimated. The basic assumption is that were peat cutting has taken place subsidence will occur and will continue for some decades and this will dry out the adjacent areas of the bog.

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 Cloonchambers Bog are assessed as Unfavourable Bad-Stable (see table 8.5).

Future Prospects

Degraded Raised Bog has decreased as result of peat cutting and this activity has not been phased out at the site. Furthermore, drainage on the high bog, on cutover bog and on adjacent agricultural land continues to damage the habitat and to hinder its recovery to FRVs, as well as minimising the likelihood of marginal ecotope improving to sub-marginal and/or Active Raised bog. Habitat **Area** is currently 70.67% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years) due to losses to peat cutting. The 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 29.63% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods due to the negative effects (i.e.

drying out) of impacting activities, **S&Fs** are expected to remain more than 25% above FRV. Thus, 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	82.07	84.87	97.34	97.34	0.00	0.00
Marginal[2]	80.93	80.09	59.46	58.54	(-)0.92	(-)1.55
Face bank[2]	na	0.99	2.42	2.42	0.00	0.00
Inactive flush	26.97	22.38	30.75	29.81	(-)0.94	(-)3.06
Total	**189.97**	**188.33**	**189.97**	**188.11**	**(-)1.86**	**(-)0.98**

[1]These 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 on the 2012 habitat survey and 2010 aerial photographs. Additional marginal and/or face bank ecotope losses have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting that cannot be estimated with the data available.

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 Cloonchambers 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's 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 and also of sub-marginal ecotope has remained unchanged in the reporting period. 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 on adjacent land continue to threaten Active and Degraded Raised Bog. These factors are also expected to have a long term negative effect on Rhynchosporion depressions. 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 Cloonchambers 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	85.55	7.66	91.05	3.83	0.38	90.08

[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.

	FRV Target (ha) [5]	**2012 value (ha)** [6]	**% above target**	**FRV 2012 Target (ha)** [7]	**2012 value (ha)** [8]	**% above target**
7120	110.22	188.11	70.67	47.03	60.96	29.63

[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
7110	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	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 37 locations in the 2004-2010 period, resulting in the loss of 1.86ha of high bog. Nineteen (19) plots were cut in 2010/2011 and 16 plots were cut in 2012, leading to further unquantified losses of high bog. Peat cutting and the presence of old face banks is considered to have a significant negative impact on the conservation status of raised bog habitats.
- A total of 1.9 km of drains on the high bog remain functional, which is a relatively low amount compared with other raised bog SACs. Nevertheless, two drainage complexes in particular, bB and the recently maintained bC, are considered to have a significant negative impact on the conservation status of raised bog habitats.
- Cutover drainage (peripheral drainage) associated with either currently active or no longer active peat cutting continue to impact on the high bog habitats. In addition, there are significant agricultural drains near the site, and the adjacent River Suck may have been subject to arterial drainage.
- No fire events have damaged the high bog in the reporting period. A severe fire event seriously damaged the north-eastern section of high bog in 2003/4.
- Invasive species, including *Pinus contorta* saplings and *Campylopus introflexus*, are considered to have only a low impact on raised bog habitats.

Changes in active peat forming areas

- There have been no real changes in the area of Active Raised Bog in the reporting period; however, several improvements have been made to mapping as a result of more comprehensive surveying and accurate mapping. Changes have been made to the boundaries of sub-central ecotope areas **Sc1, Sc2, Sc3** and **Sc4** and to the active part of flush **Y** due to more accurate mapping. An actual increase in extent of Active Raised Bog within **Sc1** cannot be ruled out, although this is likely to be the result of recovery from fire events prior to the 2004 as mentioned by Fernandez *et al*. (2005) or be associated with subsidence in the area.
- Localised natural regeneration of peat-forming habitats where there was shallow cuting or Difco cutting has been noted at several locations in Cloonchambers Bog since Kelly *et al*. (1995) survey. This type of shallow cutting can form depressions on the bog surface which

rewet when the drains become blocked. This situation allowed active peat forming vegetation to develop locally leading to Active Raised Bog once cutting and drainage activities have ceased. However, it takes decades for this vegetation type to be formed. For example, Kelly *et al*. (1995) already described these areas as regenerating cutovers. The current type of cutting, i.e. Hopper cutting, at Cloonchambers, where machinery digs much deeper will not lead to this type of situation. **Sc5** and the active part of flush **ZZ** are areas of Active Raised Bog that have developed on former Difco/shallow cutting on the high bog. These areas have been included in Active Raised Bog for the first time in 2012 due to changes in interpretation of the vegetation rather than an actual change.

- **Sc6, Sc7** and **Sc8** were mapped for the first time in 2012 due to more comprehensive surveying in 2012, which resulted in more accurate mapping.
- Subsidence and certain types of cutting may in particular limited circumstances can lead to the localised development of Active Raised Bog. Where cutting is involved it is expected that it will take decades for the Active Raised Bog to develop. However, this will in most cases be on a relatively small scale and usually caused long term irreversible impacts on other parts of the bog. In the case of subsidence if the process continues, the long term outcome is likely to be the loss of the wet areas originally created by this process.

Other changes

- The boundaries of several Degraded Raised Bog areas have been changed, and new areas of inactive flush have been mapped, due to more comprehensive surveying in 2012, which resulted in more accurate mapping.

Quadrats analysis

- Quadrat **Qsc1** was recorded as supporting lower total *Sphagnum* cover in 2012 than in 2004, including changes to the relative abundance of several *Sphagnum* species and higher cover of *Calluna*. These differences are most likely due to differences in quadrat recording methodology and error in relocating the quadrat.
- **Qsc2** data show minor differences between surveys were noted that are most likely due to differences in quadrat recording methodology and error in relocating the quadrat.
- **Qsc3** had significant differences in microtopography and species composition between survey years, most notably higher cover of *Sphagnum* hummocks and lower cover of lawns and pools in 2012. These differences may reflect drying in this part of the bog, but due to

differences in quadrat recording methodology and error in relocating the quadrat, this is uncertain.

- **Qsc4** was recorded for the first time in 2012.

Restoration works

- No restoration works have been undertaken at the site.
- NPWS have bought out turbary rights and ownership rights of various turf-cutting plots around the bog, and this is likely to have reduced the amount of turf cutting taking place at Cloonchambers Bog.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Cloonchambers Bog. Habitat Area and quality have remained stable during the reporting period. Both values are significantly below the FRVs; however, FRVs for this site may be unrealistic due to the natural topography of the site. 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 Cloonchambers Bog. Habitat Area has slightly decreased due to peat cutting. S&Fs have remained Stable. Habitat Area is significantly above the FRV, which may be set at an unrealistic level, as noted above. 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 Cloonchambers Bog. Habitat Area and quality (S&Fs) are considered to have remained Stable 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 **Cloonchambers SAC** is assessed as being **Unfavourable Bad-Declining**.

Recommendations

- **Cessation of peat cutting.**

- **Restoration works** including blocking of high bog reduced-functional and functional drains, as well as cutover drains. The drain blocking programme should be informed by a detailed hydrological survey of the bog, as recommended below.
- **Further hydrological and topographical studies** should be carried out to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value. This recommendation is particularly important for Cloonchambers Bog, given that most of the bog is relatively thin and large parts occupy drumlin slopes.
- **Detailed hydrological studies** are required to identify the drain blocking and other hydrological works that would have the greatest likelihood of enhancing the conservation status of the bog. These studies are also needed to determine the potential for impacting adjacent agricultural land and to determine appropriate measures accordingly.
- **Research on the potential for natural and assisted regeneration of peat-forming systems on cutover bog** is required. Several areas of high bog where shallow surface cutting or Difco cutting has taken place in the past have regenerated peat-forming vegetation naturally, whereas other cutover areas adjacent to high bog have not. Research is required to determine which of the latter have the potential for restoration and to develop the most appropriate restoration measures.
- **Further botanical monitoring surveys** on the high bog are required in order to assess future changes in conservation status.

References

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.

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)

Sub-Central Ecotope Complexes

COMPLEX 10/4

- **Location**: **Sc5** located on Lobe 2, south-west edge
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 10-20
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat in former cutover
- **Pools**: 4-10%
- ***Sphagnum* cover**: >90%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Lawns/Low hummocks/pools
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (4-10%), *Rhynchospora alba* (11-25%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (L; 50-75%), *S. cuspidatum* (Hollows (Hl), Pools (P); 11-25%). *S. denticulatum* (P; <4%) *Polytrichum strictum* (<4%).
- **Additional comments:** This complex was found in a newly mapped area of sub-central in a former cutover area forming continuous lawns of (mainly) *Sphagnum papillosum.*

COMPLEX 6/35

- **Location**: this complex characterised **Sc2** and **Sc3**, but was also found within **Sc1**
- **Ground**: Quaking
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: 4-10%

- **Macro-topography**: Depression
- **Pools**: 11-25%
- ***Sphagnum* cover**: 26-33%%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Tall hummocks/Low hummocks/hollows/lawns/flats/pools
- **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%), *Rhynchospora alba* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (L; 11-25%), *S. cuspidatum* (Hollows (Hl), Pools (P); 4-10%). *S. austinii* (H: <4%), *Campylopus atrovirens (<4%), Pleurozia purpurea (<4%), Racomitrium lanuginosum.*
- **Additional comments:** Quadrats **Qsc1** and **Qsc2** were recorded in this complex. This complex was soft to quaking in places with good *Sphagnum* pools and lawns, but the interpool areas had extensive *Narthecium* flats.

COMPLEX 6/4 +P

- **Location**: this complex characterised **Sc1** and **Sc6** north of Lobe 2
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Tall hummocks/Low hummocks/hollows/flats/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%), *Rhynchospora alba* (11-25%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (L; 11-25%), *S. cuspidatum* (Hollows (Hl), Pools (P); 11-25%). *S. denticulatum* (P; <4%), *S. austinii* (H: <4%), *S. fuscum* (4-10%), *S. tenellum* (<4%), *Polytrichum strictum* (<4%), *Cladonia uncialis* (<4%), *Hypnum jutlandicum, Andromeda polifolia* (<4%).

- **Additional comments: Sc1** has been enlarged since 2004, most likely due to mapping accuracy. **Sc6** was an additional area of sub-central 6/4+P south-east of **Sc1.** It was mapped due to more extensive ground-truthing and mapping accuracy than in 2004. Quadrat **Qsc4** was recorded in this community complex.

COMPLEX 9/7 +P

- **Location**: this complex characterised **Sc7** and **S**c8, but was also recorded within **Sc4**
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope northwards towards the edge of the bog
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Tall hummocks/Low hummocks/hollows/flats/pools
- **Tussocks**: *Eriophorum vaginatum* (<4-10%).
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Rhynchospora alba* (4-10%), *Carex panicea* (4-10%), *Trichophorum germanicum* (4-10%), *Menyanthes trifoliata* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (L; 4-10%), *S magellanicum (<4%), S. cuspidatum* (Pools (P); (11-25%). *S. denticulatum* (P; <4%), *S. austinii* (H: <4%), *S. fuscum* (<4%), *S. tenellum* (<4%), *Campylopus atrovirens* (<4%).
- **Additional comments: Sc4** was on a slope and the pools were large (possibly tear pools) linear/curved and were interconnecting in places. They were not strictly oriented perpendicular to the slope. The pools were mostly full of *Sphagnum cuspidatum*. The interpool areas were quite firm and dominated by *Calluna* and *Eriophorum vaginatum*. Quadrat **Qsc3** was recorded in **Sc4** in this complex type.
- **Sc7** was a newly mapped area of sub-central 9/7+P similar to **Sc4** but the pools were somewhat smaller. There were notable large hummocks of *Racomitrium lanuginosum* up to 50cm high in places and forming islands in some pools. *Sphagnum magellanicum* and *S. papillosum* often fringed the edges of the pools. **Sc8** also newly mapped was similar to **Sc7**, but with less pools.

- A patch (1.5mx0.5m) of *Sphagnum pulchrum* was found emergent from a pool in the south-west of **Sc4** (E 161689 / N 280234). This species had not been recorded in previous surveys and was not recorded anywhere else on the site during 2012.

Active flushes

FLUSH Y

- **Location**: at the centre of the site located between Lobe 1 and lobe 4. It was surrounded by the inactive flush **Y**
- **Ground**: Firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 30-40cm
- ***Cladonia* cover**: absent
- **Macro-topography**: flat/depression
- **Pools**: absent
- ***Sphagnum* cover**: 4-10 -11-25% at centre of flush
- ***Narthecium* cover**: absent
- **Micro- topography**: Tussocks of *Molinia caerulea* / flat.
- **Tussocks**: *Molinia caerulea* 50-75%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (50-75%), *Myrica gale* (*11-25%), Phragmites australis (<4%), Calluna vulgaris* (4-10%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Juncus subnodulosus* (<4%), *Juncus effusus* <4%) *Sphagnum palustre* (4-10%), *Aulacomnium palustre (<4%), Polytrichum strictum (<4%), Vaccinium oxycoccos (<4%).*
- **Additional comments:** The active flush had large hummocks of *Sphagnum palustre* up to 40cm high in places and the *Myrica* shrubs were up to 1.6m tall. Also the *Molinia* was quite tussocky. Localised patches of *Juncus subnodulosus* were notable and indicative of a more base-rich groundwater influence.

FLUSH ZZ

- **Location**: northwest corner of Lobe 2
- **Ground**: very soft
- **Physical indicators**: cutover bog
- ***Calluna* height**: 31-40cm

- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope to west
- **Pools**: <4% regular
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks, pools, lawns
- **Tussocks**: *Trichophorum germanicum* (<4%), *Eriophorum vaginatum* (<4%).
- **Degradation or regeneration evidence**: vigorous *Sphagnum* growth
- **Species cover**: *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (11-25%), *Erica tetralix* (4-10%), *Molinia caerulea* (4-10%), *Rhynchospora alba* (4-10%), *Eriophorum angustifolium* (<4%), *Sphagnum papillosum* (26-33%), *S. capillifolium* (<4%), *S. cuspidatum* (26-33%), *S. magellanicum* (<4%).
- **Additional comments:** Flush **ZZ** has been expanded to include an area of cutover bog, which was included in the original high bog site and formerly mapped as marginal ecotope. A small area of this flush was active. This section was essentially a flushed variant of sub-central complex 10/4 (on cutover) with higher vascular plant cover, especially *Eriophorum vaginatum*. Scattered *Molinia caerulea* was also present. Active flush grades into inactive *Molinia caerulea* dominated flush, as described below.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 6/2 +CL

- **Location**: north-east and middle sections of Lobe 4
- **Ground**: Very soft, occasionally quaking
- **Physical indicators**: absent
- ***Calluna* height**: <10cm
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: flat-gently sloping towards flush **Y**
- **Pools**: absent
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (<4%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (11-25%), *Cladonia portentosa* (34-50%), *C. ciliata* (<4%), *Carex panicea* (<4%),, *Andromeda polifolia (<4%), Sphagnum cuspidatum (<4%), S. capillifolium* (11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. austinii* (<4%).
- **Additional comments** This flat area was near the main flush **Y**. It was almost sub-central in places. There was a surprisingly low cover of *Calluna* and high cover of *Cladonia* (34-50%) and relatively high cover of *Andromeda polifolia*.

COMPLEX 7/6/4

- **Location**: south-east and north-west parts of Lobe 4
- **Ground**: Firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: flat
- **Pools**: (<4%, locally up to 10%)
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10%, in patches 20%
- **Micro- topography**: Low hummocks/hollows/pools
- **Tussocks**: Absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (11-25%), *Carex panicea* (4-10%), *Sphagnum cuspidatum (4-10%), S. capillifolium* (11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%).
- **Additional comments:** This complex was different to the more frequent 9/7/6 in the presence of pools often with *S. cuspidatum* and the greater extent of *Rhynchospora alba* and *Narthecium* flats. It was almost sub-central in places. It seems as if it may have been wetter in the past, and the drier flats with *Narthecium* and *Rhynchospora* suggest it may be drying up.

COMPLEX 9/7

- **Location**: north-east section of Lobe 4 and across entire Lobe 1
- **Ground**: soft to firm

- **Physical indicators**: absent
- ***Calluna* height**: 30-40cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle slope to south
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: absent
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (<4%).
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%), *Carex panicea* (<4%), *S. capillifolium* (H; 11-25%), *S. papillosum* (H; <4%), *S. tenellum* (H; <4%).
- **Additional comments:** The *Calluna* was tall and tussocky. South of M2, this 9/7 complex becomes hard under-foot and there was a gradual transition to marginal ecotope.
- Between M1 and M2, the area mapped marginal in 2004 was a mosaic of sub-marginal 9/7, 9/7/6 and 9/7/3 in 2012. The ground was variable soft to firm. It was slightly flushed in places with *Myrica gale.*

COMPLEX 9/7/6

- **Location**: throughout high bog
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 10-20cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle slope
- **Pools**: (<4%)
- ***Sphagnum* cover**: 11-25%
- ***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* (4-10%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Narthecium ossifragum* (4-10%), *Rhynchospora*

alba (<4%), *Carex panicea* (4-10%), *Trichophorum germanicum* (<4%) *Sphagnum cuspidatum (4-10%), S. capillifolium* (H; 4-10%), *S. papillosum* (H; <4%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%).

- **Additional comments:** This complex was prevalent in much of sub-marginal vegetation in Lobes 1, 4 and 5. The *Sphagnum* cover was quite variable in this complex from 4-25%; where it was low it graded into marginal 3/6 or 3/6/2 with an increase usually in *Narthecium* flats. The firmness of the ground was also very variable. This may be related to the recovery from burning in 2003, where now although sub-marginal vegetation has recovered, the underlying peat was still hard in places. It was often difficult to decide if this complex was a marginal or sub-marginal one.
- Where *Eriophorum angustifolium* was more abundant than *E. vaginatum*, this complex was mapped as 9a/7/6. Variants with occasional regular (relict) pools or tear pools were mapped as 9/7/6+P or 9/7/6+TP, respectively. Where *Myrica gale* was occasionally present, the complex was mapped as 9/7/6+My; where *Molinia* was occasionally present, the complex was mapped as 9/7/6+Mo.

Marginal Ecotope Complexes

COMPLEX 3/6

- **Location**: this was the most widespread marginal ecotope community complex at this site and it was found across much of the marginal areas of the site
- **Ground**: firm
- **Physical indicators**: bare peat (<4%)
- ***Calluna* height**: 20-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle to steep slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%, locally up to 15%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Trichophorum germanicum* (<1%), *Sphagnum capillifolium* (H; <4-10%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H; <4%),

Campylopus introflexus (<4%), *Myrica gale* (<1%). *Cladonia* species present (<4%) included *C. uncialis, C. gracilis* and *C. floerkeana.*

- **Additional comments**: This marginal complex was soft in places and transitional to sub-marginal complex in places where the *Sphagnum* cover increased to 15% and *Eriophorum* spp. increased to 4-10%.
- Where the vegetation was similar, but *Trichophorum germanicum* was frequent, variant 3/6/2 was mapped. Flushed variants 3/6/2+Mo (where both *T. germanicum* and *Molinia* were frequent) and 3/6+My (where *Myrica gale* was frequent) were also mapped occasionally.

COMPLEX 3/6/4

- **Location**: Lobe 5 to the north-east of **Sc4** and Lobe 2 surrounding flush **ZZ**
- **Ground**: firm but wet
- **Physical indicators**:
- ***Calluna* height**: 10-20cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle to steep slope
- **Pools**: <4%
- ***Sphagnum* cover**: 4-10%,
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: low hummocks/*Narthecium ossifragum* flats/ hollows
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (11-25%), *Trichophorum germanicum* (4-10%), *Carex panicea* (4-10%) *Sphagnum capillifolium* (H; <4-10%), *S. tenellum* (H; <4%), <4%), *S. papillosum* (4-10%).
- **Additional comments**: This complex differs from 3/6 in that *Rhynchospora alba* is abundant and the ground is notably wetter. A variant with large linear tear pools/erosion channels (on a slope near the eastern edge of Lobe 5) was mapped as 3/6/4+P. The interpool areas were very firm but wet and the extent of the *Rhynchospora/Narthecium* flats suggest this area was wetter in the past.

COMPLEX 7/2

- **Location**: slope to north of flush **Y** and scattered throughout site

- **Ground**: firm
- **Physical indicators**: bare peat 4-10%
- ***Calluna* height**: 21-30 cm (-40 cm in places)
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle to steep slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%,
- ***Narthecium* cover**: <4% (often absent)
- **Micro- topography**: low hummocks/ hollows
- **Tussocks**: *Trichophorum germanicum* (4-10%), *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%) (-25% in places), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (4-10%) (-25% in places), *Carex panicea* (<4%, frequent) *Sphagnum capillifolium* (4-10%), *S. tenellum* (<4%, occasional), *S. papillosum* (<4%, occasional), *Hypnum jutlandicum* (<4%, occasional).
- **Additional comments**: Firm, low hummocks and tussocks underfoot. *Calluna, Trichophorum* and *Eriophorum vaginatum* were the most prominent species. Micro-topography was very poor and uneven. Slope to north of flush **Y** was a steep bank dissected with probably natural water flow channels. Vegetation within channels was an uphill extension of the flush: tall *Eriophorum vaginatum* and *Calluna vulgaris*, often with *Molinia caerulea* and 50+% cover of *Sphagnum*. Between channels were hard ridges dominated by *Calluna* and vegetation described as above. Where *Myrica gale* was occasional, this complex was mapped as 7/2+My.

COMPLEX 3/2

- **Location**: scattered throughout Lobes 1 , 2 and 5
- **Ground**: firm
- **Physical indicators**: bare peat 4-10%
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%,
- ***Narthecium* cover**: <4%
- **Micro- topography**: low hummocks/ hollows

- **Tussocks**: *Trichophorum germanicum* (4-10%), *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (4-10%), *Carex panicea* (11-25%) *Sphagnum capillifolium* (<4%, occasional), *S. tenellum* (<4%, occasional), *Cladonia floerkeana* (<4%, occasional).
- **Additional comments**: Very firm, well drained peat. Occurs in places on lower slopes of mineral mounds at intersection with deep, level peat. A flushed variant with *Molinia* was occasionally mapped as 3/2+Mo.

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along parts of the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: <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 cespitosum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Trichophorum cespitosum* (<1%), *Narthecium ossifragum* (<4%), *Andromeda polifolia* (<1%), *Sphagnum capillifolium* (H; <1%), *S. tenellum* (H; <1%), *S. subnitens* (H; <1%), *Hypnum jutlandicum* (<4%).
- **Additional comments**: *Phragmites australis* <4% and *Molinia caerulea* <4% were sometimes found along the face banks.

Inactive Flushes

FLUSH A

- **Location**: Described from southern edge of Lobe 3
- **Ground**: Firm
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: absent
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* absent**
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Fairly flat, few Low hummocks
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (50-75%), *Myrica gale* (<4%), *Narthecium ossifragum* (4-10%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *Trichophorum germanicum* (<4%), *Calluna vulgaris* (<4%), *E. vaginatum* (<4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<1%), *Vaccinium oxycoccos* (<1%), *Aulacomnium palustre* (<1%), *Sphagnum capillifolium* (<4%), *S. papillosum* (<4%), *S. tenellum* (<4%).
- **Additional comments:** The area of inactive flush **A** had increased since 2004. There was active turf cutting close by at the southern edge of Lobe 3.

FLUSH B

Newly mapped area of inactive flush on the south-west margin of Lobe 2. Similar to flush **ZZ**.

FLUSH C

- **Location**: Between Lobes 4 and 5, north-west of drain bC
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 30-40cms
- ***Cladonia* cover**: absent
- **Macro-topography**: slopes down to drain bC
- **Pools**: absent

- ***Sphagnum*** 4-10%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Slope few hummocks
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (>90%), *Myrica gale* (4-10%), *Juncus effusus* (<4%), *Calluna vulgaris* (<4%), *Eriophorum vaginatum* (<4%), *Succisa pratensis* (<4%), *Sphagnum palustre (<4%), S. capillifolium* (<4%).
- **Additional comments:** This was mapped as a grassland area in 1994 and 2004. A fence along the edge of it suggests it may have been grazed in the recent past. The species composition was not as grassy in 2012 as it was in the previous surveys. It was adjacent to flush **X** to the south-west, where *Molinia* still dominates, but *Phragmites australis* occurred also <4% and increased to > 50% in the adjoining cutover area at the edge of the bog.

FLUSH D

Flush **D** comprised two small mounds (D1 & D2) slightly elevated (1.5m high) from the adjacent bog. They were dominated by rank *Calluna* 40-50cm high (76-90% cover) with frequent *Phragmites* (4-10%). The ground was firm and under the heather was *Hypnum jutlandicum* (<4%), *Cladonia* (<4%) and *Eriophorum vaginatum* (<4%). The ground layer was mainly composed of prostrate *Calluna* stems and litter. Other species occurring occasionally included *Aulacomnium palustre, Dicranum scoparium, Sphagnum capillifolium* and *Pleurozium schreberi*.

FLUSH E

This flush on the western side of Lobe 5 was similar to flush **Y2**, but with no *Phragmites*.

FLUSH V

- **Location**: Lobe 1, surrounding mound M2
- **Ground**: Firm
- **Physical indicators**: absent
- ***Calluna* height**: 40+ cm
- ***Cladonia* cover**: absent
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%

- ***Narthecium* cover**: absent
- **Micro- topography**: Low hummocks, hollows
- **Tussocks**: *Molinia caerulea* (76-90%), *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (76-90%), *Myrica gale* (4-10%), *Erica tetralix* (<4%, occasional), *Eriophorum vaginatum* (<4%, occasional), *Calluna vulgaris* (11-25%), *Vaccinium oxycoccos* (<4%, occasional), *Juncus effusus* (<4%, rare), *Sphagnum capillifolium* (<4%, occasional).
- **Additional comments:** A typical *Molinia*-dominated inactive flush.

FLUSH W

This flush was on the north side of Lobe 1 on a gentle slope towards the north, dominated by *Molinia* (>90%), with *Myrica* (<4%), *Calluna vulgaris* (<4%), *Carex panicea* (<4%), *Eriophorum angustifolium* (<4%). Flush **W** has been extended westwards to include an area of former cutover with wet flushy vegetation recovering from being cutover. *Molinia* was <4%, *Myrica* <4% here. There were lines of *Calluna* (11-25%) suggestive of former cutting with difco machine. The ground was firm and *Sphagnum* cover was <10%.

FLUSH Y

- **Location**: Centre of site between lobes 1 and 4
- **Ground**: Firm
- **Physical indicators**: absent
- ***Calluna* height**: 30-40cms
- ***Cladonia* cover**: absent
- **Macro-topography**: Base of slope in a valley
- **Pools**: absent
- ***Sphagnum* cover:** 4-10%
- ***Narthecium* cover**: absent
- **Micro- topography**: Fairly flat, few Low hummocks
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (>90%), *Myrica gale* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *Calluna vulgaris* (<4%), *Succisa pratensis (<4%), Sphagnum capillifolium* (<4%).
- **Additional comments:** This was an extensive flush in a depression/valley between Lobes 1 and 2. Drain bB flowed through the centre of it in a north-west direction. It was comprised of

a lawn of *Molinia caerulea,* not tussocky and quite dry, becoming wetter towards the active flush **Y** area.

FLUSH Y1

This flush was similar to flush **Y2** (below). It was a linear band of flush extending south of the main Flush Y area, but not on a slope.

FLUSH Y2

- **Location**: on a slope south-west of Lobe 1 and connecting to larger flush **Y**
- **Ground**: Firm
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* 25-33%**
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (>90%), *Phragmites australis* (4-10%), *Carex panicea* (<4%), *Eriophorum vaginatum* (11-20%), *Trichophorum germanicum* (<4%), *Calluna vulgaris* (11-25%), *Succisa pratensis, Sphagnum capillifolium* (25-33%), *S. papillosum* (<4%), *Hypnum jutlandicum* (<4%).
- **Additional comments:** A typical *Molinia*-dominated inactive flush.

FLUSH YY

This flush at the eastern edge of Lobe 1 was dominated by tussocky *Molinia caerulea* (>90%) and tall *Myrica gale* (4-10%) up to 1m high. Although it was flushed wet, there were no *Sphagna*.

FLUSH Z

- **Location**: West of Lobe 1
- **Ground**: soft
- **Physical indicators**: absent

- ***Calluna* height**: 20-30cms
- ***Cladonia* cover**: 4-10
- **Macro-topography**: On a Slope
- **Pools**: absent
- ***Sphagnum*** 11-25**%**
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Phragmites australis* (4-10%), *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (<4%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Rhynchospora alba (<4%), Sphagnum capillifolium* (11-25-%), *S. papillosum* (<4%), *S. tenellum* (4%), *Hypnum jutlandicum* (<4%).
- **Additional comments:** This flush was an area of stunted *Phragmites australis* (<1m high) over 9/7/6 (sub-marginal) vegetation.

FLUSH ZZ

This flush was located adjacent and to the west of flush **YY**. Although drier, the vegetation was similar to flush **YY**.

Mineral Mounds

There were four (mineral) mounds on the north-eastern side of the site which were elevated above the adjoining bog and were dominated by tall heather.

Mound M1: This mineral mound was situated in the east end of Lobe 1. It was mapped as face bank ecotope, but in reality was dry heath vegetation with sessile oak scrub developing. *Calluna vulgaris* approximately 1 m tall was dominant (90+% cover). Multi-stemmed *Quercus petraea* trees/shrubs approximately 1.5-2 m tall were abundant. Frequently occurring were *Pteridium aquilinum, Pseudoscleropodium purum, Molinia caerulea* and *Vaccinium myrtillus*. *Luzula sylvatica, Hedera helix, Lonicera periclymenum, Hypnum jutlandicum, Rubus fruticosus, Sorbus aucuparia* and *Vaccinium vitis-idaea* were occasional.

Mound M2: This mineral mound was mapped as face bank ecotope, but in reality supported dry heath vegetation. *Calluna vulgaris* dominated (90+% cover) and averaged 40+ cm in height, exceeding 1 m in some places. Also frequently occurring were *Molinia caerulea* and *Hypnum jutlandicum*. *Salix aurita* shrubs approximately 1 m tall and multi-stemmed *Quercus petraea*

shrubs 1-2 m tall were occasionally found, particularly where the mound merges with adjacent inactive flush **V**.

Mound M3: Small mound <5m high with firm ground. dominated by *Calluna vulgaris* 20-30cm high and cover 75-90%. *Molinia caerulea* (4-10%), *Trichophorum germanicum* (<4%) and *Hypnum jutlandicum* (4-10%) were frequent to occasional.

Mound M4: As with the other mounds, this mound was mapped as face bank ecotope, but in reality was species-poor dry heath vegetation. *Calluna vulgaris* 30-40 cm tall dominated (99% cover). *Molinia caerulea* occurred frequently and *Trichophorum germanicum* was occasional.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Cloonchambers Bog in both Active and Degraded Raised Bog. Only *Rhynchospora alba* was recorded within the 2012 survey at this site.

R. alba is found in nearly all ecotopes in the site, including: sub-central ecotope (10/4, 6/35, 6/4+P, 9/7+P); sub-marginal ecotope (6/2+Cl, 7/6/4, 9/7, 9/7/6) and marginal ecotope (3/6/4).

The species becomes very frequent within complexes 10/4 (sub-central); 6/4+P (sub-central); 6/2+Cl (sub-marginal); 7/6/4 (sub-marginal); and 3/6/4 (marginal).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum papillosum* and *S. cuspidatum*. It was also found within damp *Narthecium ossifragum* dominated hollows and flats in sub-marginal and marginal ecotope complexes. In these situations, it appears to be associated with higher quality degraded bog habitats that were wetter and of better quality in the relatively recent past.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSC00388	NE	Overview	Qsc1	06/11/2012
DSC00389	NE	Overview	Qsc2	06/11/2012
DSC00390	NE	Overview	Qsc4	06/11/2012
DSC00398	NE	Overview	Qsc3	08/11/2012

Appendix III Quadrats

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6/4/10 + pools**	**6/35**	**6/4/10 + pools**	**6/35**
Quadrat Name	Qsc1	Qsc1	Qsc2	Qsc2
Easting	162528	162530.80	162598	162598.14
Northing	280586	280582.30	280471	280471.53
Date	14/07/2004	06/11/2012	14/07/2004	06/11/2012
Firmness	very soft	Quaking	quaking	Quaking
Burnt	No	No	No	No
Algae in hollows %	Absent	1-3 (several indiv)	Absent	4-10
Algae in pools %	4-10	1-3 (many indiv)	4-10	4-10
Bare peat %	Absent	Absent	Absent	Absent
High hummocks %	Na	Absent	na	Absent
Low hummocks %	34-50	34-50	11-25	34-50
Hollows %	11-25	4-10	4-10	11-25
Lawns %	4-10	11-25	4-10	4-10
Pools %	11-25	11-25	4-10	11-25
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		na	
S.fuscum hum type	Na	Absent	na	Absent
S.fuscum hum %	4-10	Absent	na	Absent
S.fuscum height(cm)	Na	Absent	na	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6/4/10 + pools**	**6/35**	**6/4/10 + pools**	**6/35**
Trichophorum type	Flats	Tussocks	Tussocks	Tussocks
Trichophorum %	Na	1-3 (several indiv)	1-3 (many indiv)	1-3 (few indiv)
S.magellanicum %	11-25	Absent	na	Absent
S.cuspidatum %	11-25	4-10	na	4-10
S.papillosum %	1-3 (many indiv)	26-33	Absent	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	1-3 (many indiv)	11-25	4-10	11-25
S.tenellum %	Na	1-3 (few indiv)	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	1-3 (few indiv)
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	11-25	4-10	4-10	4-10
N.ossifragum %	11-25	11-25	11-25	11-25
Sphag pools %	4-10	4-10	4-10	1-3 (many indiv)
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	4-10	4-10	4-10	Absent
Sphag humm %	34-50	34-50	11-25	11-25
Sphag holl %	11-25	4-10	4-10	1-3 (several indiv)
Total Sphag %	51-75	34-50	11-25	11-25
Hummocks indicators	S.austinii&S.fuscum	Absent	S.austinii&S.fuscum	Absent
Cladonia portent %	1-3 (many indiv)	4-10	Absent	1-3 (several indiv)
Other Cladonia sp	Na	Uncialis, green cladonia	na	uncialis,
C. panicea %	Absent	Absent	4-10	1-3 (few indiv)
Calluna cover %	4-10	11-25	11-25	11-25
Calluna height(cm)	21-30	11-20	21-30	11-20

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**6/4/10 + pools**	**6/35**	**6/4/10 + pools**	**6/35**
Other NotableSpecies		Pleur pur, Raco lan, Camp atr, Ped pal, Dic scop		Camp atr 4-10% , Rac lan
Other comment		difference from 2004 QSC1 is due to location and Sphag id?		

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-marginal**
Complex Name	**15/6**	**9/7+p**	**6/4+P**	**3/4**
Quadrat Name	Qsc3	Qsc3	Qsc4	Qsm1
Easting	161631	161639.26	163573.12	163633
Northing	280305	280303.87	280303.47	280078
Date	14/07/2004	08/11/2012	06/11/2012	14/07/2004
Firmness	quaking	Soft	Very soft	soft
Burnt	No	No	No	Yes
Algae in hollows %	Absent	4-10	1-3 (few indiv)	1-3 (many indiv)
Algae in pools %	Absent	Absent	11-25	Na
Bare peat %	Absent	Absent	Absent	1-3 (many indiv)
High hummocks %	Na	Absent	1-3 (few indiv)	Na
Low hummocks %	4-10	51-75	34-50	26-33
Hollows %	1-3 (many indiv)	4-10	4-10	4-10
Lawns %	26-33	1-3 (many indiv)	11-25	Absent
Pools %	34-50	11-25	11-25	Absent
Pool type	Na	Interconnecting	Interconnecting	Absent
S.austinii hum type	Na	Absent	Active	Na
S.austinii hum %	Na	Absent	1-3 (many indiv)	Na

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-marginal**
Complex Name	**15/6**	**9/7+p**	**6/4+P**	**3/4**
S.austinii height(cm)	Na			Na
S.fuscum hum type	Na	Absent	Active	Na
S.fuscum hum %	Absent	Absent	4-10	4-10
S.fuscum height(cm)	Na	Absent	21-30	Na
Leucobryum glaucum	Absent	Absent	Absent	Na
Trichophorum type	Tussocks	Tussocks	Tussocks	Flats
Trichophorum %	Na	4-10	1-3 (few indiv)	11-25
S.magellanicum %	Absent	Absent	Absent	Na
S.cuspidatum %	34-50	11-25	11-25	Na
S.papillosum %	Na	4-10	11-25	Na
S.denticulatum %	Absent	Absent	Absent	Na
S.capillifolium%	4-10	11-25	11-25	4-10
S.tenellum %	Na	4-10	1-3 (many indiv)	Na
S.subnitens %	Absent	Absent	Absent	Na
R.fusca %	Absent	Absent	Absent	4-10
R.alba %	1-3 (many indiv)	1-3 (many indiv)	11-25	1-3 (many indiv)
N.ossifragum %	4-10	1-3 (several indiv)	4-10	Na
Sphag pools %	34-50	11-25	1-3 (several indiv)	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	26-33	1-3 (few indiv)	1-3 (many indiv)	Absent
Sphag humm %	4-10	26-33	34-50	26-33
Sphag holl %	1-3 (many indiv)	1-3 (several indiv)	4-10	4-10
Total Sphag %	34-50	34-50	34-50	26-33
Hummocks indicators	S.austinii	Absent	S.austinii&S.fuscum	Na
Cladonia portent %	1-3 (many indiv)	4-10	1-3 (few indiv)	Na

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-marginal**
Complex Name	**15/6**	**9/7+p**	**6/4+P**	**3/4**
Other Cladonia sp	Na	Uncialis	uncialis,	Na
C. panicea %	4-10	4-10	1-3 (several indiv)	Na
Calluna cover %	11-25	26-33	Absent	4-10
Calluna height(cm)	21-30	21-30	21-30	Na
Other NotableSpecies	d.anglica/d.rotundifolia/menianthes trifoliata	Pleur pur, Men tri, Eri vag 11-25%	Vac oxy, Pol strict	
Other comment			new quadrat	

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6/3**	**6**	**7/9/3**	**9/6**
Quadrat Name	Qsm2	Qsm3	Qsm4	Qsm5
Easting	161931	162432	162657	162500
Northing	280159	279725	279732	279929
Date	14/07/2004	14/07/2004	14/07/2004	14/07/2004
Firmness	firm-soft	soft	firm-soft	very soft
Burnt	No	No	No	No
Algae in hollows %	4-10	4-10	1-3 (many indiv)	Na
Algae in pools %	4-10	4-10	na	Na
Bare peat %	Na	na	na	Na
High hummocks %	Na	na	na	Na
Low hummocks %	11-25	4-10	11-25	11-25
Hollows %	26-33	26-33	4-10	4-10
Lawns %	Absent	Absent	11-25	11-25
Pools %	4-10	4-10	Absent	Absent
Pool type	Regular	Tear	Absent	Absent

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6/3**	**6**	**7/9/3**	**9/6**
S.austinii hum type	Na	na	na	Na
S.austinii hum %	Na	na	na	Na
S.austinii height(cm)	Na	na	na	Na
S.fuscum hum type	Na	na	na	Na
S.fuscum hum %	4-10	na	na	4-10
S.fuscum height(cm)	Na	na	na	Na
Leucobryum glaucum	Na	na	na	Na
Trichophorum type	Flats	Flats	Flats	Flats
Trichophorum %	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)	11-25
S.magellanicum %	Na	na	na	Na
S.cuspidatum %	1-3 (many indiv)	1-3 (many indiv)	11-25	11-25
S.papillosum %	Na	na	na	Na
S.denticulatum %	Na	na	na	Na
S.capillifolium%	Na	4-10	11-25	11-25
S.tenellum %	Na	na	na	Na
S.subnitens %	1-3 (many indiv)	na	na	Na
R.fusca %	1-3 (many indiv)	4-10	na	Na
R.alba %	1-3 (many indiv)	na	4-10	1-3 (many indiv)
N.ossifragum %	Na	na	na	Na
Sphag pools %	4-10	4-10	Absent	Absent
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent	11-25	11-25
Sphag humm %	11-25	4-10	11-25	11-25
Sphag holl %	4-10	4-10	4-10	4-10
Total Sphag %	11-25	4-10	11-25	11-25
Hummocks indicators	Na	na	na	Na

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6/3**	**6**	**7/9/3**	**9/6**
Cladonia portent %	1-3 (many indiv)	4-10	11-25	11-25
Other Cladonia sp	Na	na	na	Na
C. panicea %	Na	na	na	Na
Calluna cover %	26-33	34-50	34-50	26-33
Calluna height(cm)	Na	na	na	Na
Other NotableSpecies				V. oxycoccos
Other comment				

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6\2 rb**	**6/3 rb**	**3/9/6 myrica\difco**	**3/2/7**
Quadrat Name	Qsm6	Qsm7	Qsm8	Qsm9
Easting	162456	162530	162785	162696
Northing	280703	280435	280613	280246
Date	14/07/2004	14/07/2004	14/07/2004	14/07/2004
Firmness	quaking	soft	very soft	soft
Burnt	Yes	Yes	Yes	No
Algae in hollows %	na	na	Absent	Absent
Algae in pools %	4-10	Absent	Absent	Absent
Bare peat %	Absent	Absent	4-10	Absent
High hummocks %	na	na	Na	na
Low hummocks %	4-10	4-10	11-25	34-50
Hollows %	1-3 (many indiv)	4-10	11-25	1-3 (many indiv)
Lawns %	Absent	Absent	11-25	Absent
Pools %	4-10	Absent	Absent	Absent

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6\2 rb**	**6/3 rb**	**3/9/6 myrica\difco**	**3/2/7**
Pool type	Tear	Absent	Absent	Absent
S.austinii hum type	na	na	Na	na
S.austinii hum %	Absent	1-3 (many indiv)	Absent	Absent
S.austinii height(cm)	na	na	Na	na
S.fuscum hum type	na	na	Na	na
S.fuscum hum %	Absent	1-3 (many indiv)	Absent	Absent
S.fuscum height(cm)	na	na	Na	na
Leucobryum glaucum	Absent	Absent	Absent	na
Trichophorum type	Tussocks	Tussocks	Tussocks	Tussocks
Trichophorum %	4-10	4-10	4-10	34-50
S.magellanicum %	Absent	Absent	4-10	Absent
S.cuspidatum %	1-3 (many indiv)	Absent	Absent	Absent
S.papillosum %	1-3 (many indiv)	Absent	11-25	na
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	1-3 (many indiv)	4-10	Na	26-33
S.tenellum %	na	na	Na	na
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	na	4-10	Absent	Absent
N.ossifragum %	26-33	11-25	4-10	Absent
Sphag pools %	1-3 (many indiv)	Absent	Absent	Absent
Dominant pool Sphag	S.cuspidatum	Absent	Absent	Absent

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**6\2 rb**	**6/3 rb**	**3/9/6 myrica\difco**	**3/2/7**
Sphag lawns %	Absent	Absent	11-25	Absent
Sphag humm %	4-10	4-10	11-25	34-50
Sphag holl %	1-3 (many indiv)	4-10	4-10	1-3 (many indiv)
Total Sphag %	4-10	4-10	34-50	34-50
Hummocks indicators	Absent	S.austinii&S.fuscum	Absent	Absent
Cladonia portent %	na	na	Absent	1-3 (many indiv)
Other Cladonia sp	na	na	Na	na
C. panicea %	11-25	11-25	11-25	4-10
Calluna cover %	11-25	4-10	Absent	26-33
Calluna height(cm)	11-20	21-30	41-50	41-50
Other NotableSpecies	Menyanthes; Racomotrium			
Other comment				

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**9/7**	**6/3 + pools**	**2/6/3**	**6/3 + myrica**
Quadrat Name	Qsm10	Qsm11	Qsm12	Qsm13
Easting	162247	161453	161312	161079
Northing	280499	280297	280378	280284
Date	14/07/2004	14/07/2004	14/07/2004	14/07/2004
Firmness	very soft	very soft	soft	very soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent
Algae in pools %	Absent	11-25	Absent	Absent
Bare peat %	Absent	Absent	Absent	Absent

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**9/7**	**6/3 + pools**	**2/6/3**	**6/3 + myrica**
High hummocks %	Na	na	na	Na
Low hummocks %	26-33	4-10	4-10	4-10
Hollows %	34-50	1-3 (many indiv)	1-3 (many indiv)	11-25
Lawns %	Absent	Absent	Absent	Absent
Pools %	Absent	11-25	Absent	34-50
Pool type	Absent	Tear	Absent	Interconnecting
S.austinii hum type	Na	na	na	Na
S.austinii hum %	Na	na	Absent	Absent
S.austinii height(cm)	Na	na	na	Na
S.fuscum hum type	Na	na	na	Na
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	Na	na	na	Na
Leucobryum glaucum	Absent	na	4-10	Na
Trichophorum type	Flats	Tussocks	Tussocks	Tussocks
Trichophorum %	4-10	1-3 (many indiv)	1-3 (many indiv)	4-10
S.magellanicum %	Absent	Absent	Absent	4-10
S.cuspidatum %	Absent	na	Absent	26-33
S.papillosum %	Absent	na	Absent	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	11-25	4-10	4-10	4-10
S.tenellum %	Na	na	na	Na
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	Absent	na	na	11-25
N.ossifragum %	Na	11-25	11-25	11-25
Sphag pools %	Absent	1-3 (many indiv)	Absent	26-33

Ecotope type	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**	**Sub-marginal**
Complex Name	**9/7**	**6/3 + pools**	**2/6/3**	**6/3 + myrica**
Dominant pool Sphag	Absent	S.cuspidatum	Absent	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent	Absent
Sphag humm %	11-25	4-10	4-10	4-10
Sphag holl %	11-25	1-3 (many indiv)	1-3 (many indiv)	11-25
Total Sphag %	26-33	11-25	4-10	34-50
Hummocks indicators	Na	S.austinii	Absent	Absent
Cladonia portent %	Na	1-3 (many indiv)	1-3 (many indiv)	1-3 (many indiv)
Other Cladonia sp	Na	na	na	Na
C. panicea %	Absent	4-10	4-10	4-10
Calluna cover %	4-10	11-25	4-10	1-3 (many indiv)
Calluna height(cm)	21-30	21-30	21-30	41-50
Other NotableSpecies		d.anglica/d.rotundifolia		r.lanuginosum
Other comment				

Ecotope type	**Marginal**
Complex Name	**3/2 erosion channels**
Quadrat Name	Qm1
Easting	161739
Northing	280303
Date	14/07/2004
Firmness	Firm
Burnt	No
Algae in hollows %	Absent
Algae in pools %	Absent
Bare peat %	1-3 (many indiv)

Ecotope type	**Marginal**
Complex Name	**3/2 erosion channels**
High hummocks %	Na
Low hummocks %	Absent
Hollows %	4-10
Lawns %	4-10
Pools %	4-10
Pool type	Regular
S.austinii hum type	Na
S.austinii hum %	Absent
S.austinii height(cm)	Na
S.fuscum hum type	Na
S.fuscum hum %	Absent
S.fuscum height(cm)	Na
Leucobryum glaucum	Absent
Trichophorum type	Tussocks
Trichophorum %	11-25
S.magellanicum %	1-3 (many indiv)
S.cuspidatum %	4-10
S.papillosum %	Absent
S.denticulatum %	Absent
S.capillifolium%	4-10
S.tenellum %	Na
S.subnitens %	Absent
R.fusca %	Absent
R.alba %	4-10
N.ossifragum %	4-10
Sphag pools %	4-10

Ecotope type	**Marginal**
Complex Name	**3/2 erosion channels**
Dominant pool Sphag	S.cuspidatum
Sphag lawns %	4-10
Sphag humm %	Absent
Sphag holl %	4-10
Total Sphag %	11-25
Hummocks indicators	Absent
Cladonia portent %	1-3 (many indiv)
Other Cladonia sp	Na
C. panicea %	4-10
Calluna cover %	4-10
Calluna height(cm)	21-30
Other NotableSpecies	
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

Ecology and Environmental Consultants Ireland Ltd.

Cloonchambers SAC (000600)
Co. Roscommon

1:10,000

N

0 125 250 500 750 1,000 Meters

Legend

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

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Cloonchambers SAC (000600)
Co. Roscommon

1:10,000

N

0 145 290 580 870 1,160 Meters

Legend

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

Boundary type
- Flush
- SC/C
- F/C
- SM/C
- M/C
- F/SC
- SM/SC
- M/SC
- FB/SC
- F/SM
- M/SM
- SM/FB
- F/M
- M/FB
- F/FB
- Other
- SAC

Raised Bog Monitoring & Assessment Survey 2013

Map 3: Impacts (High bog drainage; Turf cutting;Fire events)

Ecology and Environmental Consultants Ireland Ltd.

Cloonchambers SAC (000600)
Co. Roscommon

1:10,000

N

0 137.5 275 550 825 1,100 Meters

Legend

High Bog drainage

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