Moyclare Bog (SAC 000581), Co. Offaly

Executive Summary

This survey, carried out in October 2012, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Moyclare 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 21.70ha (29.22%) of the high bog area. There are no active flushes at the site and high quality Active Raised Bog consists solely of central ecotope, in which the micro-topography consists of *Sphagnum* hummocks, hollows, lawns and pools. Total *Sphagnum* cover exceeds 90% in the wettest areas, and pools which typically have a very high cover of *S. cuspidatum*, are present throughout.

Degraded Raised Bog covers 52.56ha (70.78%) 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. This habitat at Moyclare Bog consists mostly of sub-marginal, marginal and face bank ecotopes, while a single small area of inactive flush was also recorded.

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. At Moyclare, the habitat was most abundant in the central ecotope community complexes 10/15 and 14, and in the sub-central community complex 4/10. It was also present in Degraded Raised Bog community complexes, but tended to be uncommon and mostly restricted to run-off channels or small tear pools.

Restoration works, in the form of drain blocking, have taken place at the site. These habitat remediation measures were carried out in the period between the surveys by Kelly *et al*. (1995) and Fernandez *et al*. (2005). Almost 3km of high bog drains are now blocked with peat dams, and the

effectiveness of this measure can be seen in the change in status of 0.384km of blocked drains from reduced-functional to non-functional during the current reporting period (table 6.2). Although none of the increases in Active Raised Bog areas recorded here were regarded as genuine improvements in habitat quality, there was evidence of some Active Raised Bog habitat getting wetter, and, therefore, a reasonable expectation that increases in habitat extent and improvements in quality will be seen in the future mainly locally.

The current conservation objective for Moyclare 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 64.45ha. The objective in relation to Structure and Functions 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.

There has been a slight decrease in the area of Active Raised Bog (-0.71ha) at Moyclare in the 2005 to 2012 period. This has been recorded in sub-central ecotope in the northern part of the site, where two separate small sub-central ecotope areas mapped by Fernandez *et al.*, (2005) are now re-classified as sub-marginal ecotope. A third sub-central ecotope area mapped in the northwest corner of the site in 2005 is also re-classified now as sub-marginal ecotope, but as this former sub-central area was based on a single mapping point, its actual extent in 2005 cannot now be reliably estimated and it is not included in the calculations for total decrease in Active Raised Bog area.

In addition to the actual loss of Active Raised Bog habitat, there have been other changes to the distribution of habitats at the site, although these are attributed to more comprehensive field mapping in 2012, rather than actual changes. An active flush formerly mapped near the centre of the high bog has been re-classified as central ecotope and incorporated into the adjacent **C1**, central area. Typical flush species were recorded here during the present survey, but not so consistently or abundantly to consider mapping the whole area, or parts of it, as flush. Other minor changes to the

boundaries of the two central ecotope areas mapped at the site (**C1** and **C2**) were attributed to the more comprehensive surveying methods in 2012, which resulted in more accurate mapping.

While three small sub-central ecotope areas in the north of the site have been entirely re-classified as sub-marginal ecotope, the larger sub-central areas, **Sc1** and **Sc2,** in the southern part of the site have been retained, and their boundaries modified, again due to the more comprehensive surveying methods in 2012, which resulted in more accurate mapping. One of the consequences of this more accurate mapping was the separation and isolation of a small area of sub-central ecotope that was previously within the southern tip of **Sc1**. This newly separated area is now labelled **Sc3**.

Peat cutting (in the northern part of the high bog) and drainage are the most threatening current activities at the site. 0.64ha of high bog have been lost in the reporting period due to peat cutting and this activity is considered to be the main reason for the decline in Active Raised Bog along the northern section of high bog.

0.439km of drains remain functional and 2.133km reduced functional. No fire events have affected the bog in the reporting period.

Active Raised Bog has been given an overall **Unfavourable Bad–Declining** conservation status assessment. Habitat Area has slightly decreased and quality (Structure and functions (S&Fs) remained unchanged in the reporting period. Current Area and structure and functions are below favourable reference values. Future Prospects are considered Unfavourable Bad-Declining although the outlook regarding control of impacting activities (peat cutting and drainage) that threaten the habitat has recently improved.

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

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

A series of **recommendations** have been also given, these include: cessation of peat cutting; restoration works on the high bog and cutover areas, hydrological and topographical studies to ascertain more accurate FRVs; further botanical monitoring surveys, potential botanical surveys on cutover to assess the efficiency of restoration works should they be attempted.

Site identification

SAC Site Code	000581	**6" Sheet:**	OY 14
Grid Reference:	E075 240	**1:50,000 Sheet:**	47
High Bog area (ha):	74.26ha [1]		
Dates of Visit:	10 & 13/09/12		
Townlands:	Ballinloman, Moyclare, Clonbonniff.		

[1] The current extent of the high bog is 74.26ha, while that reported in 2005 was 75.78ha (Fernandez *et al.*, 2005). This discrepancy is partially the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2005. High bog area has also decreased in the 2004/05-2010 period due to peat cutting. The actual high bog extent in 2005 was 74.90ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Moyclare Bog is approximately 3km west of Ferbane town, and 3km southwest of Ferbane Bog (SAC 575). Kelly *et al*. (1995) grouped Moyclare with the raised bogs of North Offaly. The bog may be accessed on the eastern side where a track leads to the bog from the adjacent public road.

Description of the survey

The survey was carried out in September 2012 and involved a vegetation survey of the high bog at Moyclare Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2005 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 Moyclare Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope, and active flush in 2005 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 2005 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 for Active Raised Bog.

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

Moyclare bog is a small bog that has been classified as a Basin bog type as it is surrounded on all sides by low relief bedrock ridges (Kelly *et al*., 1995). Peat cutting has been carried out extensively all around the site in the past, although most intensively in the north and southwest. It is now largely confined to the northern edge, and the bog is notable for the relatively high proportion of Active Raised Bog on the uncut dome. The bog has a simple long, narrow rectangular-oval shape.

Ecological Information

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

The following Raised Bog EU Annex I habitats, are found in Moyclare 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 Moyclare Bog is 21.70ha (29.22% of the high bog), which is a decrease of 2.51ha since 1994. Active Raised Bog at the site includes central and sub-central ecotope.

Central ecotope was found at two locations (**C1** and **C2**) (see Appendix IV, Map 1), and two community complexes, 14 and 10/15 were recorded in these areas. Complex 14 generally represents the wettest conditions on the high bog, and this is reflected here, where overall pool cover is in the range of 34-50%, and even higher in some of the wettest areas. Pools are typically filled with *S. cuspidatum*, while quaking mats of *Sphagnum* – mostly *S. papillosum* and *S. magellanicum* - also form a significant part of the *Sphagnum* cover. Total *Sphagnum* cover was in excess of 90%, and the micro-topography, in addition to extensive pools, includes high hummocks, low hummocks and hollows. There is a flushed element to the vegetation in complex 14, indicated by the presence of species such as *Aulacomnium palustre* and *Molinia caerulea*. However, the whole of the central ecotope supports those species and there is no distinctly flushed zone within this larger area. Complex 14 is one in which *Rhynchospora alba* is present in significant abundance.

Complex 10/15 consists of interconnecting pools, low hummocks, high hummocks and lawns. Pools cover up to 25% of the total complex area and many of them have a substantial cover of *Sphagnum cuspidatum*, with lesser amounts of *S. denticulatum* also present. *S. papillosum* and *S. magellanicum* form significant lawns, with the former also present in low hummocks, as is *S. capillifolium*. The hummock-forming *S. austinii* and *S. fuscum* were also recorded in the complex, while the total *Sphagnum* cover is in the range of 51-75%, and as high as 76-90% in places. Complex 10/15 is one in which *Rhynchospora alba* is present in significant abundance, while other significant elements of the vegetation included *Calluna vulgaris* and *Eriophorum vaginatum*. As is the case with complex 14, typical flush species such as *Andromeda polifolia*, *Dicranum scoparium* and *Vaccinium oxycoccos* are also present in this complex, although not so abundantly, either individually or collectively, as to justify the mapping of a distinct active flush area at the site.

Sub-central ecotope was found at three locations (**Sc1** to **Sc3**) (see Appendix IV, Map 1). Three community complexes were recorded. Complex 9/10 consists of high hummocks, low hummocks, hollows and pools. Pools, which are generally filled with *S. cuspidatum*, cover approximately 10% of the total area, while the total *Sphagnum* cover is in the range 34-50%, and up to 51-75% in places. *S. capillifolium* and *S. papillosum* dominate the low *Sphagnum* hummocks, while small active hummocks of *S. fuscum* were also recorded. *Eriophorum vaginatum* forms a significant element of the vegetation, with *E. angustifolium* also present, though less abundant. However, in **Sc2**, the ground is

particularly wet in places and *E. angustifolium* becomes as frequent as *E. vaginatum*. In this area complex 9/10 also grades into sub-central complex 4/10, which is partly characterised by the abundance of *Rhynchospora alba*. The micro-topography of 4/10 includes high hummocks, low hummocks, hollows, lawns and pools. Pools, which cover up to 10% of the total complex area, have a generally good cover of *S. cuspidatum*, while this species is also found in hollows throughout the complex. *S. papillosum* and *S. capillifolium* are common in low hummocks and at pool edges. Total *Sphagnum* cover is in the range of 34-50%, and is up to 51-75% in the wettest areas. Other common species include *Calluna vulgaris* and *Eriophorum vaginatum*. The third sub-central complex recorded at the site is 3/10, which is broadly similar to the other sub-central complexes, but differs in being partly characterised by the occurrence of *Carex panicea* with an overall cover value of 11-25%. In some parts of the sub-central ecotope where 3/10 was mapped, there is a greater amount of *Narthecium ossifragum* in the flats, signifying a drier, slightly degraded example of the complex, although the overall *Sphagnum* cover is still in the range of 34-50%. In common with much of the Active Raised Bog at the site, flush species such as *Aulacomnium palustre*, *Vaccinium oxycoccos*, *Andromeda polifolia* and *Polytrichum strictum* were recorded in this complex, but not so abundantly as to warrant the mapping of distinct flushed areas. *Rhynchospora fusca* was recorded in a single pool in this complex.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Moyclare Bog is 52.56ha (70.78% of the high bog).

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

The sub-marginal ecotope features the most developed micro-topography within Degraded Raised Bog, although pools are absent from the sub-marginal complexes recorded at the site. *Sphagnum* cover in sub-marginal ecotope is highest in the 9/7 community complex, in which it is in the range of 26-33%. Elsewhere, the *Sphagnum* cover within sub-marginal ecotope is in the range of 11-25%. The micro-topography typically consists of hummocks, hollows and flats, while common species include *Calluna vulgaris*, *Narthecium ossifragum*, *Eriophorum vaginatum*, *E. angustifolium*, *Erica tetralix* and *Carex panicea*. *Sphagnum capillifolium*, *S. papillosum*, and *S. subnitens* are the major hummock forming *Sphagnum* species, while *S. austinii* was also recorded, albeit quite rarely.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band around the margins of the high bog and also along the double drain bD, which traverses the high bog, separating the northern quarter of the bog from the remainder.

The micro-topography consists of *Calluna vulgaris* hummocks, low *Sphagnum* hummocks, flats and occasional hollows and tear pools. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (although over 10% in places) and the vegetation is characterised by a higher cover of *Carex panicea, Narthecium ossifragum, Trichophorum germanicum,* and *Calluna vulgaris.*

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope is found over much of the high bog margin, although not over a substantial portion of the western boundary high bog boundary.

The high bog also has two inactive flushes (flush **A** and flush **Y**), both of which are dominated by *Molinia caerulea*. Other occasional inactive flush mapping points on the high bog indicate patches of vegetation that were too small and/or scattered to be mapped and labelled as distinct flushes.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Moyclare Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. It was most frequent in the central ecotope complexes 14 and 10/15, and also in the sub-central complex 4/10. In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. Typical plant species include *Rhynchospora alba, Sphagnum cuspidatum, S. magellanicum, S. papillosum*, and *Eriophorum angustifolium*.

R. alba was also found within Degraded Raised Bog, but always associated with wet features such as hollows and erosion channels.

Rhynchospora fusca was found in a pool in the sub-central 3/10 complex.

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2012 survey of Moyclare 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 Moyclare 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	0.64ha of the high bog cut away	Inside High Bog: 25 different locations along north high bog section	**7110/7120/7150**
J02.07	Drainage	H	-1	3.80km [1]	Inside High Bog	**7110/7120/7150**
J02.07	Drainage	M	-1	n/av	Outside High Bog	**7110/7120/7150**
I02	Problematic native species	M	-1	4.0ha [3]	Inside High Bog	**7120/7110/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	4.4ha	Outside High Bog	**7110/7120/7150**
A04	Grazing	L	-1	<0.5ha	Inside High Bog	**7120/7150**
4.2	Restoring/Improving the hydrological regime	M	+1	2.782km[2]	Inside High Bog	**7110/7120/7150**

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

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

[2] This figure includes blocked drains on high bog.

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

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

Peat cutting

This activity has taken place at 25 locations (turf plots) along the northern section of high bog in the 2004/5-2010 period and has reduced the area of high bog by 0.64ha. The loss of high bog is calculated using GIS techniques on aerial photography from 2004/05 and 2010. As aerial photography is not available post 2010, it cannot be ruled out that cutting may have taken place in additional locations in the period 2011-2012. Further high bog may therefore have been lost and the figure quoted should be considered a minimum value. Recent information from the NPWS

indicates that there were no active plots at Moyclare in 2012 and 2013. However, the complete cessation of this activity at the site and that it will not be reinitiated cannot be confirmed.

Peat cutting has been carried out extensively all around the site in the past. Kelly *et al*. (1995) calculated that 31% of the high bog margin was being actively cut in 1994, while Fernandez *et al*. (2005) estimated that this figure had fallen to 12.8% by 2005. All cutting was confined to the northern margin of the bog by that time, whereas the south-southeast part of the bog also formed part of the 31% actively exploited in 1995.

In addition to the direct loss of 0.64ha of high bog, the loss of 0.71ha of Active Raised Bog in the northern section of the bog through a decline in quality to Degraded Raised Bog is also attributed to peat cutting, as is the loss of 2ha of sub-marginal ecotope through degradation to marginal ecotope. As a result, peat cutting is considered to have a high importance/impact on high bog habitats.

In addition, old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats. The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as restoration works cannot be employed until such activities stop. It should also be borne in mind that peat cutting and cutting has already had a serious negative impact over a long period at this site, indicated by the fact that ARB covers only a very small area (21.70ha or 29.22% of the high bog) and is 66.33% below the FRV target.

Drainage

High bog drainage

Table 6.2 shows a number of changes in the status of high bog drains, with minor reductions in the total length of functional, reduced functional and non-functional drains. All of these losses – 0.030km of functional drains and 0.040km of both reduced functional and non-functional drains – are due to direct losses from peat cutting. 0.439km of unblocked drains in the high bog remain functional, while 2.133km are reduced functional and 2.257km non-functional.

Flowing water was noted in drain bA. Reduced functional drains are still impacting on high bog habitats and will continue to do so until they are blocked and become completely in-filled and thus non-functional.

High bog drainage is considered to have high importance/impact on high bog habitats.

Table 6.2 High bog drainage summary

Status	2005 (km) [1]	2012 (km)	Change
NB: functional	0.469	0.439	(-) 0.030
NB: reduced functional	2.173	2.133	(-) 0.040
NB: non- functional	2.297	2.257	(-) 0.040
B: functional	0.000	0.000	0.000
B: reduced functional	1.611	1.227	(-) 0.384
B: non- functional	1.171	1.555	(+) 0.384

B: Blocked; NB: Not blocked

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

Table 6.3 below provides a more detailed description of the drainage present on the high bog at Moyclare including any change in their functionality in the 2005 – 2012 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2005 status	2012 status	Change	Comment
bA	0.270	NB: functional	NB: functional	No	Northern section of drain was wrongly classified as blocked in 2005; water flowing recorded during 2012 field survey
bA	0.384	B: reduced functional	B: non- functional	Yes	Southern section of drain
bB	0.046	B: reduced functional	B: reduced functional	No	
bC	0.078	B: reduced functional	B: reduced functional	No	
bD	0.961	B: reduced functional	B: reduced functional	No	Double drains
bE	0.222	NB: reduced functional	NB: reduced functional	No	
bF	0.627	B: non- functional	B: non- functional	No	
bG1	0.284	B: non- functional	B: non- functional	No	
bG2	0.335	NB: non-functional	NB: non- functional	No	
bG3	0.194	B: non- functional	B: non- functional	No	
bG4	0.324	NB: non-functional	NB: non- functional	No	
bH	0.113	NB: non-functional	NB: non- functional	No	

bJ	0.084	NB: non-functional	NB: non- functional	No	
bK	0.153	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bL	0.175	NB: non-functional	NB: non- functional	No	Drain already present in 2005 but not mapped
bM1	0.351	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bM2	0.352	NB: non-functional	NB: non- functional	No	This drain was wrongly classified as blocked in 2005
bM3	0.142	B: reduced functional	B: reduced functional	No	Drain already present in 2005 but not mapped; southern section of drain blocked
bM3	0.216	NB: reduced functional	NB: reduced functional	No	Drain already present in 2005 but not mapped; northern section of drain blocked
bM4	0.202	NB: non-functional	NB: non- functional	No	Drain already present in 2005 but not mapped
bN	0.169	NB: functional	NB: functional	No	Drain wrongly classified as blocked in 2005;sections reduced functional
bO	0.298	NB: reduced functional	NB: reduced functional	No	
bP	0.066	B: non- functional	B: non- functional	No	
bR	0.486	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bS	0.116	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bT	0.401	NB: non-functional	NB: non- functional	No	
bV	0.132	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bW	0.159	NB: reduced functional	NB: reduced functional	No	This drain was wrongly classified as blocked in 2005
bX	0.156	NB: non-functional	NB: non- functional	No	
bY	0.115	NB: non-functional	NB: non- 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, except in some of the most southerly sections. These drains continue to drain the high bog and impacting on high bog habitats. Drainage maintenance in adjacent agricultural land or cutover bog is not obvious on the 2010 aerial photographs for the site, although it is likely to have taken place along the northern cutover areas, where peat cutting continues.

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

Fire history

No fire events have been reported on the high bog in the current reporting period.

Fernandez *et al*. (2005) reported the absence of evidence of any significant fire events between 1994/1995 and 2005. However, Kelly *et al*. (1995) referred to a number of burns that had occurred in the years before that survey, including one along the western edge at drain bA, and another over a large area in the south. Another burn, believed to have occurred around 1990, affected the west central area of the bog and the impact of this event was evident in the absence of *Cladonia portentosa* there in the 1995 survey.

Problematic native species

Pinus sylvestris (and to a lesser extent, *Betula pubescens*) have spread from the woodland fringing the eastern side of the bog, over a significant area of high bog, particularly in the northeast and along the eastern margin of the bog. Fernandez *et al*. (2005) noted the widespread occurrence of these species on the high bog, and it is unclear if they have continued to spread during the current reporting period, although further drying of the northern part of the high bog, due to the continuation of peat cutting in this area is likely to have facilitated a further expansion of the total range.

Problematic native species are assessed as having a medium importance/impact in all high bog habitats.

Afforestation and forestry management

There is a conifer plantation of 4.4ha, approximately 100m from the high bog, to the northwest of the site. It is assessed as having a low intensity impact on the high bog habitats.

Other impacting activities

Fernandez *et al*. (2005) reported the impact of cattle encroachment and grazing over an estimated 5.8ha in the western part of the site. Damage was severe in places, and included erosion of the bog margin, and damage to high bog vegetation, with bare peat covering up to 90% of parts of the bog surface, particularly along the margin of the high bog. Damage was less severe further into the bog. Although poaching was noted in the present survey, damage was much less extensive and severe than that previously described, and was largely restricted to the northwest corner of the bog, particularly to the west of drain bA. As a result, the impact was assessed as exerting only a low importance/impact on both Degraded Raised Bog and Depressions on peat substrates of the Rhynchosporion.

A number of other activities were reported in the Natura 2000 Standard Data Form for the SAC, including grazing (code 140), fertilisation (120) and mowing/cutting. However, the possible impact of many of these activities or their relevance to raised bog habitats were not assessed in the current project.

Conservation activities

Much of Moyclare Bog has been purchased by the NPWS and a substantial proportion of high bog drains were blocked in the period between the survey by Kelly *et al*. (1995) and Fernandez *et al*. (2005). There are 2.782ha of blocked drains on the high bog, all of which have either reduced-functional or non-functional status (table 6.2). During the current reporting period there has been a change in status from reduced-functional to non-functional of 0.384ha of blocked drains. At the time of the present survey, there was no evidence of expansion or improvement in the quality of Active Raised Bog in the northern section of the high bog, as peat cutting has continued here throughout the reporting period. However, parts of the southern section appear to be re-wetting, particularly the northeast part of **Sc1**, where a substantial area of habitat formerly mapped as sub-marginal ecotope has now been re-classified as sub-central ecotope. This was not assessed as an actual increase in Active Raised Bog, only because it appeared that the 2005 survey may have been focussed unduly on isolated patches of sub-marginal habitat within the area, with the result that total area of sub-central may have been underestimated.

NPWS has also engaged in negotiation and agreements with landowners. Turf cutting has declined in intensity over recent years; Kelly *et al*. (1995) estimated that 31% of the high bog margin was actively cut in 1994, whereas Fernandez *et al*. (2005) calculated that this had dropped to 12.8% by

the time of that survey. 25 active plots, all in the northern section, were identified in the current reporting period, but information obtained from the NPWS suggests that there were no active plots in 2012.

High bog drainage blocking is reported as a positive management action having a medium importance/impact on high bog habitats as only moderate improvements have been noticed, under Restoring/Improving the hydrological regime (4.2) in table 6.1.

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 indicates a decrease of (-) 0.71ha in the area of Active Raised Bog in the reporting period. In addition to this loss, the distribution of habitat has changed in several ways.

The former **Sc4** (0.47ha) and **Sc5** (0.24ha) in the northern section of the site are no longer present. Both have disappeared as a result of drying out of the bog due to peat cutting on adjacent turf plots. Both Kelly *et al*. (1995) and Fernandez *et al*. (2005) mentioned losses of Active Raised Bog due to

peat cutting. Fernandez *et al*. (2005) recorded a significant decline in both extent and quality of Active Raised Bog, a problem compounded by the fact that a large proportion of central ecotope was lost in the years leading up to that survey. Another small area of sub-central ecotope in the northwest corner of the site has also been lost, although it is not included in the calculations of losses of Active raised Bog, as it was mapped around only a single sub-central mapping point, with the result that its true extent cannot now be reliably estimated.

More comprehensive surveying in 2012 resulted in numerous modifications to the boundaries of **Sc1**, which occupies a substantial area in the southern section of the site. Among these changes was the separation from **Sc1** of a small area of sub-central ecotope, now labelled **Sc3**, in the southwest corner of the site. Other changes to **Sc1** saw a significant area of habitat that was formerly classified as sub-marginal ecotope re-classified as sub-central ecotope and incorporated into the north-eastern side of Sc1. This was not counted as a real change however, as it appears that the previous mapping of this area (Fernandez *et al*., 2005) may have focussed unduly on the sub-marginal elements of what may have been a mosaic of sub-central and sub-marginal habitat, with the result that the actual area of sub-central habitat may have been underestimated in that survey.

Central ecotope is divided into **C1** and **C2** (as was also the case in the previous mapping of the site (Fernandez *et al*., 2005)). The mapped area of **C1** has expanded, partly because the former active flush **Z** has now been re-classified as central ecotope and incorporated into the northern part of **C1**. Flush species are a feature of much of the Active Raised Bog at Moyclare, and their frequency and abundance within this area was not significantly greater than that of much of the rest of the site, and not substantial enough to justify retaining a distinct active flush area here.

C2 is now somewhat larger due to changes brought about by the more comprehensive surveying in 2012 which resulted in more accurate mapping.

Sc2 has seen some slight boundary changes and is now smaller than before. This change is also the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.

In summary, there has been an overall loss of 0.71ha of sub-central ecotope, brought about by the losses of the entire areas of both **Sc4** and **Sc5**. All active flush has been re-classified as central ecotope. Other gains in the areas of sub-central ecotope cannot be reliably attributed to actual improvements in habitat quality, but the re-wetting of bog noted around some blocked drains may result in future improvements.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central and sub-central ecotopes) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 64.45ha (based on 1994/5 Kelly

(1995) figures amended by Fernandez *et al.* (2005), see tables 8.1 and 8.3 below). This FRV is only approximate until further hydrological and topographical studies are carried out in order to assess the maximum potential capacity of the high bog to support Active Raised Bog. The current habitat area value (21.70ha) is 66.33% below the FRV. A current area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

A long term (1994/5-2012) trend indicates a reduction in the area of Active Raised Bog at the site (2.51ha) (see table 8.1), while a more recent and short term trend analysis (7 years; 2005-2012) also shows a decrease (0.71ha or 3.17%) in the area of Active Raised Bog. Therefore, the habitat Area is given a **Decreasing** trend assessment.

The Area of Active Raised Bog at Moyclare Bog is assessed as Unfavourable Bad-Decreasing (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 10.85ha (half of 21.70ha, the current area of Active Raised Bog. The current value is 4.61ha which is 57.51% below the FRV. A current central ecotope area value (there is currently no active flush mapped at the site) more than 25% below FRV falls into the **Unfavourable Bad** assessment category and this is, therefore, the assessment that applies to S&Fs.

A long term (1994/5-2012) trend indicates a decrease in the area of central ecotope and active flush, although a short term trend (7 years; 2005-2012) shows no changes in the overall area of high quality Active Raised Bog. S&Fs are, therefore, given a **Stable** trend.

Quadrats analysis (**Qc1, Qc2 and Qsc1**) indicates the following:

Qc1: this quadrat was previously classified as the central ecotope community complex 10/9/15, whereas in 2012 it was classified as central ecotope community 10/15. There were few significant differences between the two quadrats, although the total *Sphagnum* cover of 51-75% in 2012, exceeded that of 2005 which was recorded as 34-50%. A slightly higher proportion of pools, and associated *S. papillosum* cover, may largely explain the greater *Sphagnum* cover in 2012.

Qc2: this quadrat was recorded in the central complex 14 in 2012, whereas the area in which it was recorded was mapped as active flush in 2005 and the quadrat labelled **Qf1**. The two quadrats were broadly similar, although the total *Sphagnum* cover in 2012 of 91-100% was substantially greater than the 51-75% recorded in 2005. This may be partly due to the greater area of pools and associated

greater cover of *S. cuspidatum* in 2012. Another significant difference was the 34-50% cover of *Sphagnum* hummocks in 2005, compared to the total absence of such in 2012.

Qsc1: this quadrat, within the sub-central Sc1 area was classified as complex 9/10 in 2005 and as complex 4/10 in 2012. In common with the two central ecotope quadrats, the total *Sphagnum* cover in Qsc1 in 2012 at 51-75%, was greater than that recorded in 2005 (34-50%). One significant difference in the composition of the total *Sphagnum* area was the presence of *S. austinii* at 11-25% in 2012, compared to only a few individuals in 2005. *Sphagnum* hummocks also made up a larger proportion of the quadrat in 2012 than was the case in 2005. Such changes may be the result of minor discrepancies in quadrat location.

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

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

Future Prospects

The habitat Area has slightly decreased in the current reporting period, primarily as a result of losses of sub-central ecotope due to peat cutting in the northern part of the high bog. However, S&Fs were assessed as having a Stable trend due to lack of change in high quality Active Raised Bog area in the reporting period. Peat cutting has also substantially declined in intensity in recent years and information received from the NPWS indicates that there were no active plots in 2012 and 2013. However, the complete cessation of this activity at the site and that it will not be reinitiated cannot be confirmed.

Impacting activities, most notably high bog drainage, continue to negatively impact on the habitat, although blocking of drains has occurred and some formerly reduced-functional drains have become non-functional in the reporting period.

Pinus sylvestris has spread over a substantial part of the bog, which is likely to be an indication of drying out of the high bog. It is not clear, however, if the spread has continued over the current reporting period, as Fernandez *et al*. (2005) also indicated the widespread occurrence of the species over substantial areas of the high bog.

Habitat **Area** is currently 66.33% below FRV (see table 8.4) and a Decreasing trend is foreseen despite damaging impacts appear to be declining in intensity. 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 57.51% 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).

Cessation of peat cutting is necessary. Blocking of the remaining high bog functional and reduced-functional drains should also lead to an improvement in the Area and S&Fs of Active Raised Bog. Fire events, which have not been a recent issue at the site, should continue to be controlled. Cutover areas (particularly along the north and south of the bog) will play a major role in the restoration of the habitat, particularly if it proves difficult to regenerate previous Active Raised Bog values on the high bog.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994[1]	2005	2005 (amended)	2012	Change (2005-2012)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	9.12	4.09	4.61	4.61	0.00	0.00
Sub-central	13.86	16.36	17.80	17.09	(-) 0.71	(-) 3.99
Active flush	1.23	0.88	0.00	0.00	0.00	0.00
Total	**24.21**	**21.33**	**22.41**	**21.70**	**(-) 0.71**	**(-) 3.17**

[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.

Note: Table 8.1 includes 2005 figures and 2005 amended figures. The latter shows the ecotope area believed to be present in 2005 after surveying improvements in 2012. The comparison between 2005 (amended) and 2012 illustrates the actual changes in ecotope area in the 2005-2012 period. Any change in ecotope area between the 2005 and the 2005 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2012 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
C1	Qc1, Qc2	Stable	Changes in boundary. Former active flush Z now deemed to be part of C1.	Qc1: recorded in the central complex 10/9/15 in 2005, but as central complex 10/15 in 2012. Total *Sphagnum* cover 51-75% in 2012, 34-50%

Area	Quadrats	Trend	Comment	Quadrats analysis
			This change is the result of re-interpretation of vegetation. However, boundary changes also due to a more comprehensive surveying in 2012 which resulted in more accurate mapping.	in 2005. A slightly higher proportion of pools, and associated *S. papillosum* cover, may largely explain the greater *Sphagnum* cover in 2012. Few other significant differences between the two quadrats. Qc2: recorded in the central complex 14 in 2012, but as active flush in 2005. Quadrats broadly similar, although total *Sphagnum* cover in 2012 was 91-100%, and 51-75% in 2005. This may be partly due to the greater area of pools and associated greater cover of *S. cuspidatum* in 2012. Also 34-50% cover of *Sphagnum* hummocks in 2005, but 0% in 2012.
C2	None	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc1	Qsc1	Stable (possibly improving)	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping. Northeast section of Sc1 possibly improving as a result of blocking of drains.	Qsc1: recorded as complex 9/10 in 2005 and as complex 4/10 in 2012. Total *Sphagnum* cover 51-75% in 2012, 34-50% in 2005. *S. austinii* 11-25% in 2012, compared to only a few individuals in 2005. *Sphagnum* hummocks also made up a larger proportion of the quadrat in 2012 than was the case in 2005. Changes may be the result of minor discrepancy in quadrat location.
Sc2	Qsc2	Stable	Slight changes in boundary (smaller). This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	Qsc2 is a new quadrat and there are, therefore, no data for the purposes of comparison.
Sc3	None	Stable	Changes in boundary. This sub-central ecotope area was previously considered to be part of large Sc1.However, now is deemed to be separated from it. This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.	
Sc4	None	No longer present	This sub-central ecotope area has been lost due to drying out processes associated with peat cutting along northern section of high bog.	

Area	Quadrats	Trend	Comment	Quadrats analysis
Sc5	None	No longer present	This sub-central ecotope area has been lost due to drying out processes associated with peat cutting along northern section of high bog.	
Z	None	No longer present	Former active flush Z now deemed to be part of C1. This change is the result of re-interpretation of vegetation.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 9.81ha at Moyclare Bog. This value corresponds with the difference between the current high bog area (74.26ha) and the Active Raised Bog FRV (64.45ha) for area. Degraded Raised Bog is a particular habitat type, for which a FRV smaller than the current value, may be desirable in many sites. However any decrease in habitat area would only be considered positive, when it is the result of restoration to Active Raised Bog. Current habitat Area is 435.78% bigger than FRV and therefore the habitat area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3 shows a small decrease in the area of sub-marginal ecotope in the reporting period. This is the net result of a number of factors including the deterioration of sub-central ecotope to sub-marginal ecotope, and also the deterioration of sub-marginal ecotope to marginal ecotope. The former **Sc4** and **Sc5** and a further small area of sub-central ecotope in the northwest corner of the site are thought to have declined in quality as a result of drying out processes associated with turf cutting along the northern margin of the bog, and are now entirely re-classified as sub-marginal ecotope. Also in the northern section of the high bog, 2ha of sub-marginal ecotope has been re-classified as marginal ecotope, also thought to be a result of the drying out of habitats caused by turf cutting in this part of the bog. Other changes to the boundaries of Degraded Raised Bog habitat areas are attributed to the more comprehensive surveying and mapping that took place in the current project. Among these is the mapping of the small, inactive flush A in the east of the site. Its previous omission from the mapped habitat areas is likely due to insufficient surveying in that particular location.

A substantial expanse of former sub-marginal ecotope has been re-classified as sub-central ecotope and incorporated into the northeast corner of **Sc1**. This, again, is thought to be due to more comprehensive mapping in the present survey, although there are indications of re-wetting associated with drain blocking here, and future improvements in habitat quality may be expected.

Table 8.3 indicates that there has been an increase (0.07ha) in the area of Degraded Raised Bog. The net increase is the result of degradation of Active Raised Bog (0.71ha) and a high bog loss of 0.64ha caused by peat cutting. As a result the habitat is given an **Increasing** trend.

The Area of Degraded Raised Bog at Moyclare Bog is assessed as Unfavourable Bad-Increasing (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 13.14ha (25% of 52.56ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (19.68ha) is 49.77% 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 shows a net increase in the area of marginal ecotope, resulting from 2ha of sub-marginal ecotope degrading to marginal ecotope, and the direct loss of 0.4ha of marginal ecotope through turf cutting. Face bank has decreased by (-) 0.24ha, caused by direct losses from turf cutting along the northern edge of the high bog. 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 DRB's S&Fs at Moyclare are given a **Declining** trend.

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

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

Future Prospects

Degraded Raised Bog has decreased as result of peat cutting. This activity has also damaged the habitats S&Fs. Furthermore, drainage on the high bog and in the adjacent cutover continues to damage the habitat and to hinder its recovery to FRVs, as well as minimising the chances to convert

face bank and marginal ecotope into sub-marginal and/or Active Raised bog. The drying out processes associated with turf cutting may have contributed to the spread of *Pinus sylvestris* on the high bog, particularly as it is most abundant in the northern part of the bog. Turf cutting has now declined in intensity to the point where no active plots were identified in 2012/13. However, it cannot be confirmed that this activity will not be reinitiated at the site.

Habitat **Area** is currently 435.78% above FRV (see table 8.4) and an Increasing trend is expected in the following two reporting periods (12 years) due to the presence of negatively impacting activities. As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Increasing**. Habitat's **S&Fs** are currently 49.77% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods, **S&Fs** are expected to remain more than 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

The overall habitat's Future Prospects are Unfavourable Bad-Declining (see table 8.5)

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	**1994[1]**	**2005**	**2005 (amended)**	**2012**	**Change (2005-2012)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	40.24	36.92	34.02	32.73	(-) 1.29	(-) 3.79
Marginal[2]	11.59	12.42	13.85	15.45	(+) 1.60	(+) 11.55
Face bank[2]	na	4.90	4.47	4.23	(-) 0.24	(-) 5.37
Inactive flush	0.00	0.20	0.15	0.15	0.00	0.00
Total	**51.83**	**54.44**	**52.49**	**52.56**	(+) **0.07**	(+) **0.13**

[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 in the 2012 habitat survey and 2010 aerial photographs. It cannot be ruled out that further marginal and/or face bank ecotope losses may have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting.

Note: Table 8.3 includes 2005 figures and 2005 amended figures. The latter shows the ecotope area believed to be present in 2005 after surveying improvements in 2012. The comparison between 2005 (amended) and 2012 illustrates the actual changes in ecotope area in the 2005-2012 period. Any change in ecotope area between the 2005 and the 2005 (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 Moyclare 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 has slightly decreased in the reporting period, due to losses of sub-central ecotope in the northern part of the bog, while the drying out processes associated with turf cutting have also led to the degradation of 2ha of sub-marginal ecotope to marginal ecotope. As result habitat Area is given a **Decreasing** 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 high bog and cutover drainage continue to threaten Active and Degraded Raised Bog, and this implies 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 Moyclare 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	64.45	21.70	66.33	10.85	4.61	57.51

[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	9.81	52.56	435.78	13.14	19.68	49.77

[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&F 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-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7120	Unfavourable Bad-Increasing	Unfavourable Bad-Declining	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting has continued at the site during the current reporting period and has taken place at 25 locations along the northern margin of the bog. 0.64ha of high bog have been lost in this period due to peat cutting and this activity is considered to be the primary reason for the decline in Active Raised Bog along the northern section of high bog. Information received from the NPWS indicates that there were no active turf cutting plots in 2012. However, the complete cessation of this activity at the site and that it will not be reinitiated cannot be confirmed.
- Much of the site is now in state ownership and drain blocking has been carried out in a substantial number of drains, with the result that only 0.439km of drains on the high bog remain functional. However, 2.133km of drains are reduced functional and this continues to impact on high 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. It is unclear if there was any drainage maintenance in adjacent agriculture land during the reporting period, although some maintenance is likely to have taken place along the northern cutover areas, where peat cutting continued to take place.
- No fire events have damaged the high bog in the reporting period, nor has there been any evidence of such events since the 1995 survey by Kelly *et al*. (1995), when some recent burn damage was seen in some western and southern parts of the high bog.
- *Pinus sylvestris* (and to a lesser extent *Betula pubescens*) have spread across a substantial portion of the high bog, from the woodland that fringes the eastern margin of the bog. They are particularly common in the northeastern part of the site and their abundance there is probably symptomatic of the drying-out of the bog that is believed to have occurred there. It is unclear if the status of these species on the high bog is significantly different from that recorded in 2005 (Fernandez *et al*., 2005).

Changes in active peat forming areas

- Figures indicate an overall (-) 0.71ha decrease in Active Raised bog, which is comprised of 0.47ha and 0.24ha in **Sc4** and **Sc5**, respectively, representing the entirety of these former sub-central areas that have now been re-classified as sub-marginal ecotope. In addition to

this recorded loss of Active Raised Bog, the distribution of the habitat has changed considerably and other peat forming areas have been either lost or newly described. Another area of sub-central ecotope (not labelled in the report by Fernandez *et al*., (2005)) in the northwest corner of the site has also been re-classified as sub-marginal ecotope. However, it has been omitted from the calculations of lost Active Raised Bog, as it was formerly mapped on the basis of a single point and there is, therefore, no way of now estimating a realistic area for this habitat. It should, nevertheless, be considered as evidence of a decline in this part of the high bog, as the area was traversed during the field visits for the present survey, and no Active Raised Bog ecotope was recorded there. Losses of sub-central ecotope in this section of the high bog are all attributed to drying out processes associated with the peat cutting that has persisted along the northern margin of the bog.

- More comprehensive surveying in 2012 has resulted in numerous modifications to the boundaries of existing Active Raised Bog areas, among them the separation of a small area of sub-central ecotope (now labelled **Sc3**) in the southwest corner of the site, that was formerly part of **Sc1**.

- The former active flush **Z** is now deemed to be central ecotope and has been incorporated into **C1**. Flush species are a feature of much of the Active Raised Bog at Moyclare, but in common with the rest of the site, they are not present in such abundance in the former flush Z, that it should be mapped as a distinct flush. This change is, therefore, the result of re-interpretation of vegetation, rather than a real change in habitat quality.

- The large sub-central, **Sc1** area that occupies a substantial part of the southern section of the high bog has seen numerous boundary modifications that have led to an increase in its total area. This is most obvious in the northeast part of the habitat, where a substantial area formerly mapped as sub-marginal ecotope, has been re-classified as sub-central ecotope and incorporated into **Sc1**. This has not been assessed here as a genuine change in habitat quality as it was clear during the present survey that isolated patches of sub-marginal quality ecotope still exist in the area, even though the greater part of the area is of sub-central ecotope quality and, therefore, more appropriately mapped as such. It would appear, however, that the area is at least getting wetter as a result of drain blocking and a future improvement in habitat quality here may be anticipated.

- **Sc2**, in the northwest corner of the southern section of the bog, has seen some slight boundary changes that have resulted in a smaller overall area. This change is the result of more comprehensive surveying in 2012 which resulted in more accurate mapping.

- Central ecotope at the site is still divided into two distinct areas, **C1** and **C2**, in the southern part of the high bog, both of which have seen slight boundary changes that are the result of more comprehensive surveying in 2012, which resulted in more accurate mapping. The former active flush, **Z**, has also been incorporated into **C1**, following the re-interpretation of the vegetation there, leading to an increase in the area of central ecotope.

Other changes

- 2ha of former sub-marginal ecotope in the northern section of the high bog has been lost (re-classified as marginal ecotope), in a change attributed to drying out processes associated with peat cutting along the northern edge of the bog.
- A previously undescribed inactive flush, now labelled **A**, has been mapped in the east side of the site, alongside drain bF.

Quadrats analysis

- **Qc1**: this quadrat was recorded in the central ecotope community complex 10/9/15 in 2005, but as central ecotope complex 10/15 in 2012. Total *Sphagnum* cover of 51-75% in 2012, exceeded that of 2005 which was 34-50%. A slightly higher proportion of pools, and associated *S. papillosum* cover, may largely explain the greater *Sphagnum* cover in 2012. There were few other significant differences between the two quadrats,
- **Qc2**: this quadrat was recorded in the central complex 14 in 2012, whereas the area in which it was recorded was mapped as active flush in 2005. The two quadrats were broadly similar, although the total *Sphagnum* cover in 2012 was 91-100%, and 51-75% in 2005. This may be partly due to the greater area of pools and associated greater cover of *S. cuspidatum* in 2012. Another significant difference was the 34-50% cover of *Sphagnum* hummocks in 2005, compared to the total absence of such in 2012.
- **Qsc1**: this quadrat was recorded as complex 9/10 in 2005 and as complex 4/10 in 2012. Total *Sphagnum* cover in Qsc1 in 2012 at 51-75%, was greater than that recorded in 2005 (34-50%). One significant difference in the composition of the total *Sphagnum* area was the presence of *S. austinii* at 11-25% in 2012, compared to only a few individuals in 2005. *Sphagnum* hummocks also made up a larger proportion of the quadrat in 2012 than was the case in 2005. Such changes may be the result of minor discrepancies in quadrat location.

Restoration works

- Much of the site is now in state ownership and a significant number of the high bog drains have been blocked in attempts to restore/improve the quality of high bog habitats. Almost

3km of blocked drains were mapped in the current survey, and 0.384km of these drains have changed in status from reduced-functional to non-functional in the reporting period. Evidence of habitats becoming wetter as a consequence of drain blocking was seen in **Sc1**, particularly in the eastern side of that sub-central ecotope area. Although the recorded expansion of Active Raised Bog in this area could not be definitively attributed to a genuine improvement in habitat quality (due mostly to some uncertainty regarding the approach taken to the interpretation of habitats here in the 2005 survey (Fernandez *et al*., 2005)), the wetter conditions may be expected to lead to expansion and improvement in good quality habitat in the future.

- NPWS has engaged in negotiation with landowners in relation to the cessation of peat cutting at the site and although there were 25 active turf plots identified during the reporting period, none of these were thought to have been cut in 2012.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Moyclare Bog. Habitat Area has slightly decreased, while quality is unchanged in the reporting period. However both values are below the FRVs. The loss of habitat is due to degradation of sub-central ecotope in the northern part of the site, associated with peat cutting and drainage. Future Prospects are considered **Unfavourable Bad-Declining.**
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Moyclare Bog. Habitat Area has slightly increased, primarily due to a decline in sub-central ecotope that has seen 0.71ha re-classified as sub-marginal ecotope. Habitat's structure and functions have also declined due to peat cutting. Habitat Area is above the FRV. Future Prospects are considered **Unfavourable Bad-Declining** as there were no measurable improvements during the reporting period, although the outlook may be positive for the control of significant damaging activities.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Moyclare Bog. Habitat Area has decreased and quality (S&Fs) remained unchanged in the reporting period. Future Prospects are considered **Unfavourable Bad-Declining** due to the presence of negatively impacting activities (peat cutting and drainage).

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

Recommendations

- **A cessation of peat cutting.** Current information suggests this may now have been achieved at the site.
- **Further restoration works** including the blocking of all remaining high bog reduced-functional and functional drains, as well as cutover drains.
- **Possible restoration of cutover,** particularly along the north and south cutover areas where there is clear potential for this to be achieved. This may be particularly important if it proves unfeasible to reach the ARB target on high bog alone.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** on the high bog in order to assess changes in the conservation status of habitats, and potential monitoring surveys of cutover areas if they become part of future restoration programmes at the site.

References

Fernandez, F., Fanning, M., McCorry, M. and Crowley, W. 2005. *Raised Bog Monitoring Project 2004-05*. Unpublished report, National Parks & Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Kelly, L., Doak, M. and Dromey, M. 1995. *Raised Bog Restoration Project: An Investigation into the Conservation and Restoration of Selected Raised Bog Sites in Ireland*. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.

Kelly, L. & Schouten, M.G.C. 2002. Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*, pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands.

Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Central Ecotope Complexes

COMPLEX 14

- **Location**: northern section of **C1**
- **Ground**: quaking
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 1-4%
- **Macro-topography**: dome of the high bog
- **Pools**: 34-50% (higher in places)
- ***Sphagnum* cover**: >90%
- ***Narthecium* cover**: 1-4%
- **Micro-topography:** high hummocks/low hummocks/hollows and pools
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (H; 5-10%), *S. cuspidatum* (P/L; 51-75%), *S. papillosum* (H; 11-25%), *S. magellanicum* (H&L; 5-10%), *S. austinii* (H; 1-4%), *Calluna vulgaris* (11-25%), *Rhynchospora alba* (11-25%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (1-4%), *Erica tetralix* (1-4%), *Carex panicea* (1-4%), *Vaccinium oxycoccos* (1-4%), *Andromeda polifolia* (1-4%), *Leucobryum glaucum* (1-4%), *Drosera anglica* (1-4%), *Menyanthes trifoliata* (1-4%), *Polytrichum strictum* (1-4%).
- **Additional comments**: the area mapped as flush **Z** in 2004/2005 (Fernandez *et al.*, 2005) is now included in central ecotope as the entire area is more appropriately assigned to central complex 14. Although there is a flushed element to the vegetation, indicated by the presence of species such as *Aulacomnium palustre* and *Molinia caerulea*, the whole of the central ecotope supports those species and there is no distinctly flushed zone within this larger area.

COMPLEX 10/15

- **Location**: this complex characterises the southern section of **C1** and **C2**

- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 26-33cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: dome of the high bog; partly sloping to east
- **Pools**: 11-25% (interconnecting)
- ***Sphagnum* cover**: 51-75% (76-90% in places)
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** low hummocks/high hummocks/lawns and pools
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (H; 4-10%), *S. cuspidatum* (P&L 34-50%), *S. papillosum* (H&L; 26-33%), *S. magellanicum* (5-10%), *S. denticulatum* (P; 1-4%), *S. austinii* (active; 5-10%), *S. fuscum* (H; 1-4%), *Rhynchospora alba* (11-25%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (1-4%), *Calluna vulgaris*, (11-25%), *Erica tetralix* (1-4%), *Vaccinium oxycoccos* (1-4%), *Andromeda polifolia* (1-4%), *Dicranum scoparium* (1-4%), *Drosera anglica* (1-4%), *Leucobryum glaucum* (<1%).
- **Additional comments**: none

Sub-Central Ecotope Complexes

COMPLEX 9/10

- **Location**: west and east sections of **Sc1** and **Sc2**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 1-4%
- **Macro-topography**: flat/gentle slope
- **Pools**: 4-10%
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** high hummocks/low hummocks/hollows/pools
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no

- **Species cover**: *Sphagnum capillifolium* (H; 11-25%), *S. cuspidatum* (P/Hl; 11-25%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; 1-4%), *S. austinii* (H/active; 5-10%), *S. magellanicum* (H/L; 5-10%), *Calluna vulgaris* (34-50%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (1-4%), *Rhynchospora alba* (5-10%), *Carex panicea* 5-10%.
- **Additional comments**: an occasional patch of 9/10 has a higher cover of *Eriophorum angustifolium* (11-25%), and is somewhat wetter, than most of the area occupied by the complex. *Calluna vulgaris* and *Carex panicea* are also less frequent in these wetter areas, with overall cover of 11-25% and 1-4%, respectively. This complex is also developing around the western side of the infilled drain bF, where it grades into sub-central complex 4/10 in places.

COMPLEX 4/10

- **Location**: **Sc2**, **Sc3** and north and south sections of **Sc1**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: flat
- **Pools**: 4-10%
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** high hummocks/low hummocks/hollows/lawns/pools
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Rhynchospora alba* (11-25%), *Sphagnum capillifolium* (H; 5-10%), *S. cuspidatum* (P/Hl; 5-10%), *S. papillosum* (H/L; 26-33%), *S. tenellum* (H; 1-4%), *S. austinii* (H, active; 1-4%), *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (1-4%), *E. angustifolium* (1-4%), *Carex panicea* (1-4%), *Dicranum scoparium* (1-4%), *Polytrichum strictum* (1-4%).
- **Additional comments**: This complex was similar to both 9/10 and 3/10, and differed mainly in the relative abundance of *Rhynchospora alba*. *R. fusca* was also recorded in this complex.

COMPLEX 3/10

- **Location**: western section of **Sc1**
- **Ground**: soft to very soft (very wet)
- **Physical indicators**: absent

- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: flat
- **Pools**: 5-10%
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** high hummocks/low hummocks/hollows/flats/pools
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Carex panicea* (11-25%), *Sphagnum capillifolium* (H; 5-10%), *S. cuspidatum* (P/Hl; 5-10%), *S. papillosum* (H; 11-25%), *S. magellanicum* (H&L; 1-4%), *S. fuscum* (H; 1-4%), *S. denticulatum* (1-4%), *S. austinii* (H, active; 1-4%), *Calluna vulgaris* (11-25%), *Rhynchospora alba* (11-25%), *Eriophorum vaginatum* (1-4%), *E. angustifolium* (11-25%), *Leucobryum glaucum* (1-4%), *Erica tetralix* (<4%), *Drosera anglica* (1-4%).
- **Additional comments**: Flush species such as *Aulacomnium palustre*, *Vaccinium oxycoccos*, *Andromeda polifolia* and *Polytrichum strictum* were also recorded in the complex, but not so consistently or abundantly as to justify mapping the whole area or parts of it as flush. In the southern part of the sub-central ecotope where 3/10 was mapped, there is a greater amount of *Narthecium ossifragum* in the flats, signifying a drier, slightly degraded example of the complex. *Rhynchospora fusca* was recorded in one pool in the east side of the site.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7

- **Location**: east side of site, near drain bG
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope to east (bog margin)
- **Pools**: absent
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 1-4%

- **Micro-topography:** low hummocks/high hummocks/hollows
- **Tussocks:** *Eriophorum vaginatum* 1-5%; *Trichophorum germanicum* <1%
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (5-10%), *S. cuspidatum* (<1%), *S. papillosum* (5-10%), *S. tenellum* (1-4%), *S. austinii* (<1%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (5-10%), *Cladonia portentosa* (11-25%).
- **Additional comments**: none

COMPLEX 6/3/9

- **Location**: this is the most widespread sub-marginal ecotope complex at the site
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: gentle slope to the bog margin
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 26-33%
- **Micro-topography:** low hummocks/hollows/flats
- **Tussocks:** *Trichophorum germanicum* 1-4%
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (H; 5-10%), *S. papillosum* (H; 5-10%), *S. subnitens* (H; 5-10%), *Narthecium ossifragum* (26-33%), *Calluna vulgaris* (11-25%), *Rhynchospora alba* (1-4%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (5-10%), *Racomitrium lanuginosum* (1-4%), *Carex panicea* (11-25%), *Erica tetralix* (5-10%).
- **Additional comments**:
  - Variant 1: 6/3: In some areas where the ground was generally firmer underfoot, the cover of *E. vaginatum* and *E. angustifolium* was lower (both no higher than 1-4%), while *Carex panicea* (26-33%) and *Narthecium ossifragum* (34-50%) were more frequent. These areas were considered to represent a more degraded form of complex 6/3/9, and being otherwise quite similar, they were given the assignation of sub-marginal complex 6/3 (variant of 6/3/9).
  - Variant 2: 3/6/9: in the northern part of the site, there were some areas of sub-marginal habitat that were broadly similar to complex 6/3/9, differing significantly only in the relative frequencies of *Carex panicea* and *Narthecium ossifragum*. Where *C. panicea* was clearly

more common, the complex variant 3/6/9 was recorded. In the south end of the site, *Trichophorum germanicum* was occasionally a significant element of the vegetation in 6/3/9, but not sufficiently so, as to require another community complex or community complex variant to be introduced.

Sub-central ecotope was previously mapped in a number of locations in the northern extreme of the high bog (Fernandez *et al*., 2005). However, all of these were adjudged in the current survey to be sub-marginal ecotope, referable to the community complex 6/3/9. In the northeast corner, adjacent to the bM drain complex, the former sub-central area **Sc5** had some parts wetter than adjacent sub-marginal, but this was probably at least partly due to tears and cracking damage from drying of the bog. Some parts of this former sub-central area were, in fact, borderline marginal ecotope (complex 3/6). The adjacent sub-central **Sc4** was also mapped here as sub-marginal, as it was little different to the surrounding sub-marginal 6/3/9 complex, with the exception being some slightly wetter areas with a marginally higher *Sphagnum* cover. A third former sub-central area in the northwest part of the site was also mapped here as sub-marginal. The previous mapping of this sub-central area was based on only a single sub-central community complex point. A number of very small patches of habitat here could arguably have been assigned to sub-central ecotope, but each of these was considered too small to map as a distinct community complex. The recorded change in this instance may, therefore, be due to a differing approach taken to the treatment of isolated small patches of vegetation, rather than a real change in habitat quality.

Marginal Ecotope Complexes

COMPLEX 2/7

- **Location**: west side of the bog
- **Ground**: firm, though wet
- **Physical indicators**: bare peat 5-10%
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 5-10% (11-25% in places)
- **Macro-topography**: steep slope to bog margin
- **Pools**: ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** hummocks/flats/tussocks
- **Tussocks:** *Trichophorum germanicum* 34-50%
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (26-33%), *Sphagnum capillifolium* (H; 1-4%), *S. papillosum* (H; 5-10%), *S. cuspidatum* (Hl; 5-10%), *Carex panicea* (1-4%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (1-4%), *E. angustifolium* (1-4%), *Rhynchospora alba* (1-4%).
- **Additional comments**: Poaching damage in places, likely due to intermittent access by cattle. Three *Quercus* seedlings, all 10-20cm in height, were recorded in this area.

COMPLEX 3/6

- **Location**: northern section of the high bog
- **Ground**: firm
- **Physical indicators**: bare peat 1-4%
- ***Calluna* height**: 21-40cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: gentle slope to drain
- **Pools**: tear pools 1-4%
- ***Sphagnum* cover**: 1-4%
- ***Narthecium* cover**: 11-25%
- **Micro-topography:** low hummocks/hollows
- **Tussocks:** *Trichophorum germanicum* 1-4%
- **Degradation or regeneration evidence**: no
- **Species cover**: *Carex panicea* 5-10%, *Calluna vulgaris* (11-25%), *Erica tetralix* 11-25%, *Sphagnum capillifolium* (1-4%), *S. cuspidatum* (<1%), *S. papillosum* (<1%), *Eriophorum vaginatum* (5-10%), *E. angustifolium* (1-4%).
- **Additional comments**:
  - Variant 1: 3/6/2: *Trichophorum germanicum* was present in this complex in the north east of the site. Where it was particularly common (near the double drains bD), the complex variant 3/6/2 was recorded. This part of the bog showed some of the negative effects of drying, with tear pools and slumping/subsidence of peat observed.

Inactive flushes

FLUSH A

- **Location**: east side of site, alongside drain bF
- **Ground**: mostly firm, occasionally soft to very soft
- **Physical indicators**: absent

- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope to bog margin
- **Pools**: 1-4%
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 26-33%
- **Micro-topography:** low hummocks/hollows/flats
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (H; 5-10%), *S. cuspidatum* (Hl&P; 5-10%), *S. papillosum* (5-10%), *S. tenellum* (H; 5-10%), *S. palustre* (5-10%), *Calluna vulgaris* (11-25%), *Molinia caerulea* (26-33), *Carex panicea* (5-10%), *Erica tetralix* (1-4%), *Aulacomnium palustre* (<4%), *Andromeda polifolia* (<4%), *Polytrichum strictum* (1-4%), *Leucobryum glaucum* (1-4%), *Trichophorum germanicum* (1-4%).
- **Additional comments**: *Molinia caerulea* is most common along the margins of the drain (bF) that runs across this area. *Pinus sylvestris* (5-10%) is colonising the margins of the bog from the adjacent mixed woodland edge. A number of trees here were up to 2.5m in height, although most were between 0.5-1.0m.

FLUSH Y

- **Location**: south end of site, adjacent to **Sc3**
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope to bog margin
- **Pools**: none
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 5-10%
- **Micro-topography:** low hummocks/hollows/flats
- **Tussocks:** absent
- **Degradation or regeneration evidence**: no
- **Species cover**: *Sphagnum capillifolium* (H; 5-10%), *S. papillosum* (1-4%), *S. tenellum* (H; 1-4%), *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (11-25%), *Aulacomnium palustre* (<4%),

Andromeda polifolia (<4%), *Polytrichum strictum* (1-4%), *Vaccinium oxycoccos* (<4%), *Trichophorum germanicum* (1-4%).

- **Additional comments**: there are several small *Pinus* trees/shrubs in the flush

Face bank Complexes

COMPLEX 1

- **Location**: described from east edge of bog; this complex was found over much of the bog margin
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 41-60cm
- ***Cladonia* cover**: 5-10%
- **Macro-topography**: steep slope to bog margin
- **Pools**: absent
- ***Sphagnum* cover**: 1-4%%
- ***Narthecium* cover**: absent
- **Micro-topography:** low hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence**:
- **Species cover**: *Sphagnum capillifolium* (1-4%), *Calluna vulgaris* (76-90%), *Hypnum jutlandicum* (5-10%), *Eriophorum vaginatum* (11-25%) and *Cladonia portentosa* (5-10%).
- **Additional comments**: none

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Moyclare Bog in both Active and Degraded Raised Bog, but it is only found occasionally on degraded habitat. *Rhynchospora alba* was commonly recorded during the present survey at this site, while *R. fusca* was present though very rare in the sub-central complexes 4/10 and 3/10.

R. alba is found in all ecotopes in Moyclare Bog, such as: central ecotope 10/15 and 14; sub-central ecotope (9/10; 4/10; 3/10); sub-marginal ecotope (9/7; 6/3; 6/3/9; 3/6/9), marginal ecotope (3/6; 3/6/2) and face bank ecotope (1).

The species becomes very frequent within complexes 4/10 (sub-central) and 10/15 and 14 (central).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum cuspidatum*, *S. papillosum* and *S. magellanicum*.

It was also found in sub-marginal and marginal ecotope complexes, although in these ecotopes it was mostly confined to erosion channels or small tear pools.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
13092012107	NE	Overview	Qsc2	13/09/2012
DSCF3568	NE	Overview	Qc2	10/09/2012
DSCF3574	NE	Overview	Qsc1	10/09/2012
DSCF3575	NE	Overview	Qc1	10/09/2012

Appendix III Quadrats

Ecotope type	**Central**	**Central**	**Flush**	**Central**
Complex Name	**10/9/15**	**10/15**	**14**	**14**
Quadrat Name	Qc1	Qc1	Qf1	Qc2
Easting	207826	207828.97	207777	207776.30
Northing	224073	224071.93	224207	224203.23
Date	14/03/2005	10/09/2012	14/03/2005	10/09/2012
Firmness	very soft	Very soft	very soft	Very soft
Burnt	No	No	No	No
Algae in hollows %	1-3 (few indiv)	Absent	Absent	Absent
Algae in pools %	4-10	Absent	Absent	Absent
Bare peat %	1-3 (few indiv)	Absent	Absent	Absent
High hummocks %	na	Absent	na	Absent
Low hummocks %	34-50	34-50	34-50	26-33
Hollows %	4-10	4-10	4-10	Absent
Lawns %	Absent	Absent	Absent	Absent
Pools %	11-25	26-33	34-50	51-75
Pool type	Regular	Regular	Interconnecting	Interconnecting
S.austinii hum type	na	Active	na	Absent
S.austinii hum %	4-10	4-10	Absent	Absent
S.austinii height(cm)	na	11-20	na	Absent
S.fuscum hum type	na	Absent	Absent	Absent
S.fuscum hum %	1-3 (many indiv)	Absent	Absent	Absent
S.fuscum height(cm)	na	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent

Ecotope type	**Central**	**Central**	**Flush**	**Central**
Complex Name	**10/9/15**	**10/15**	**14**	**14**
Trichophorum type	Tussocks	Absent	Absent	Flats
Trichophorum %	4-10	Absent	Absent	Absent
S.magellanicum %	1-3 (many indiv)	Absent	4-10	1-3 (many indiv)
S.cuspidatum %	11-25	11-25	34-50	51-75
S.papillosum %	11-25	26-33	11-25	4-10
S.denticulatum %	1-3 (many indiv)	1-3 (many indiv)	Absent	Absent
S.capillifolium%	4-10	4-10	4-10	4-10
S.tenellum %	na	Absent	na	Absent
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	1-3 (few indiv)	Absent	Absent	Absent
R.alba %	1-3 (many indiv)	11-25	4-10	11-25
N.ossifragum %	1-3 (many indiv)	4-10	Absent	1-3 (several indiv)
Sphag pools %	11-25	11-25	34-50	51-75
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent	Absent
Sphag humm %	26-33	34-50	34-50	Absent
Sphag holl %	1-3 (many indiv)	4-10	Absent	Absent
Total Sphag %	34-50	51-75	51-75	91-100
Hummocks indicators	S.austinii & S.fuscum	S.austinii	Absent	Absent
Cladonia portent %	4-10	4-10	1-3 (many indiv)	Absent
Other Cladonia sp	na		na	
C. panicea %	Absent	Absent	Absent	1-3 (few indiv)
Calluna cover %	4-10	4-10	4-10	11-25
Calluna height(cm)	11-20	11-20	21-30	21-30
Other Notable Species		Dicranum scoparium		Drosera anglica Menyanthes trifoliata;

Ecotope type	**Central**	**Central**	**Flush**	**Central**
Complex Name	**10/9/15**	**10/15**	**14**	**14**
				Vaccinium oxycoccos
Other comment				Molinia caerulea adjacent to quadrat (was Qf1)

Ecotope type	**Central**	**Central**	**Flush**
Complex Name	9/10	4/10	4/10
Quadrat Name	Qsc1	Qsc1	Qsc2
Easting	207884	207885.832	207779.211
Northing	223927	223926.237	224387.069
Date	14/03/2005	10/09/2012	13/09/2012
Firmness	soft	Very soft	Soft
Burnt	No	No	No
Algae in hollows %	4-10	Absent	Absent
Algae in pools %	1-3 (few indiv)	Absent	Absent
Bare peat %	1-3 (few indiv)	Absent	1-3 (many indiv)
High hummocks %	na	4-10	11-25
Low hummocks %	34-50	34-50	26-33
Hollows %	4-10	11-25	4-10
Lawns %	Absent	Absent	Absent
Pools %	4-10	4-10	11-25
Pool type	Regular	Regular	Regular
S.austinii hum type	na	Active	Absent
S.austinii hum %	1-3 (many indiv)	11-25	Absent
S.austinii height(cm)	na	21-30	Absent
S.fuscum hum type	na	Active	Absent
S.fuscum hum %	1-3 (many indiv)	1-3 (many indiv)	Absent

Ecotope type	**Central**	**Central**	**Flush**
Complex Name	9/10	4/10	4/10
S.fuscum height(cm)	na	11-20	Absent
Leucobryum glaucum	Absent	Absent	Absent
Trichophorum type	Tussocks	Absent	Absent
Trichophorum %	1-3 (few indiv)	Absent	Absent
S.magellanicum %	Absent	1-3 (many indiv)	Absent
S.cuspidatum %	4-10	4-10	Absent
S.papillosum %	26-33	26-33	4-10
S.denticulatum %	Absent	Absent	Absent
S.capillifolium%	4-10	4-10	26-33
S.tenellum %	na	1-3 (many indiv)	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent
R.alba %	1-3 (many indiv)	11-25	11-25
N.ossifragum %	4-10	4-10	1-3 (few indiv)
Sphag pools %	4-10	4-10	11-25
Dominant pool Sphag	S.cuspidatum	S.cuspidatum	S.cuspidatum
Sphag lawns %	Absent	Absent	Absent
Sphag humm %	34-50	51-75	26-33
Sphag holl %	4-10	4-10	Absent
Total Sphag %	34-50	51-75	34-50
Hummocks indicators	S.austinii & S.fuscum	S.austinii& S.fuscum	Absent
Cladonia portent %	1-3 (many indiv)	1-3 (few indiv)	1-3 (many indiv)
Other Cladonia sp	na	no	C.uncialis
C. panicea %	Absent	Absent	Absent

Ecotope type	**Central**	**Central**	**Flush**
Complex Name	9/10	4/10	4/10
Calluna cover %	4-10	26-33	26-33
Calluna height(cm)	11-20	21-30	21-30
Other Notable Species		no	Dicranum scoparium & Polytrichum
Other comment		Similar to previous; S.austinii greater now - location?	S. austinii adjacent to quadrat; Eriophorum vaginatum tussocks 10%. No stick to mark quadrat

Note: Data for those 2005 quadrats re-surveyed in 2012 is given to the right of the original 2005 quadrat data in table above. Not all quadrats reported in 2005 were re-surveyed in 2012. Nonetheless, all 2005 quadrat data is given above. Additional quadrats were recorded where necessary. Some 2005 quadrats may have been classified under a different ecotope category in 2012; further detail is given within the report.

Appendix IV Survey maps

207200 000000

208100 000000

224600 000000

224000 000000

Qsc2

Sc2

Qc2

C1

C2

Qc1

Sc1

Qsc1

Y

Sc3

A

Moyclare House

MOYCLARE DEMESN

BALLINLOMAN

B.M.193·5

B.M.179·8

B.M.104·8

191

190

184

200

207

240

243

716

193

14

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Moyclare SAC (000581)
Co. Offaly

1:6,000

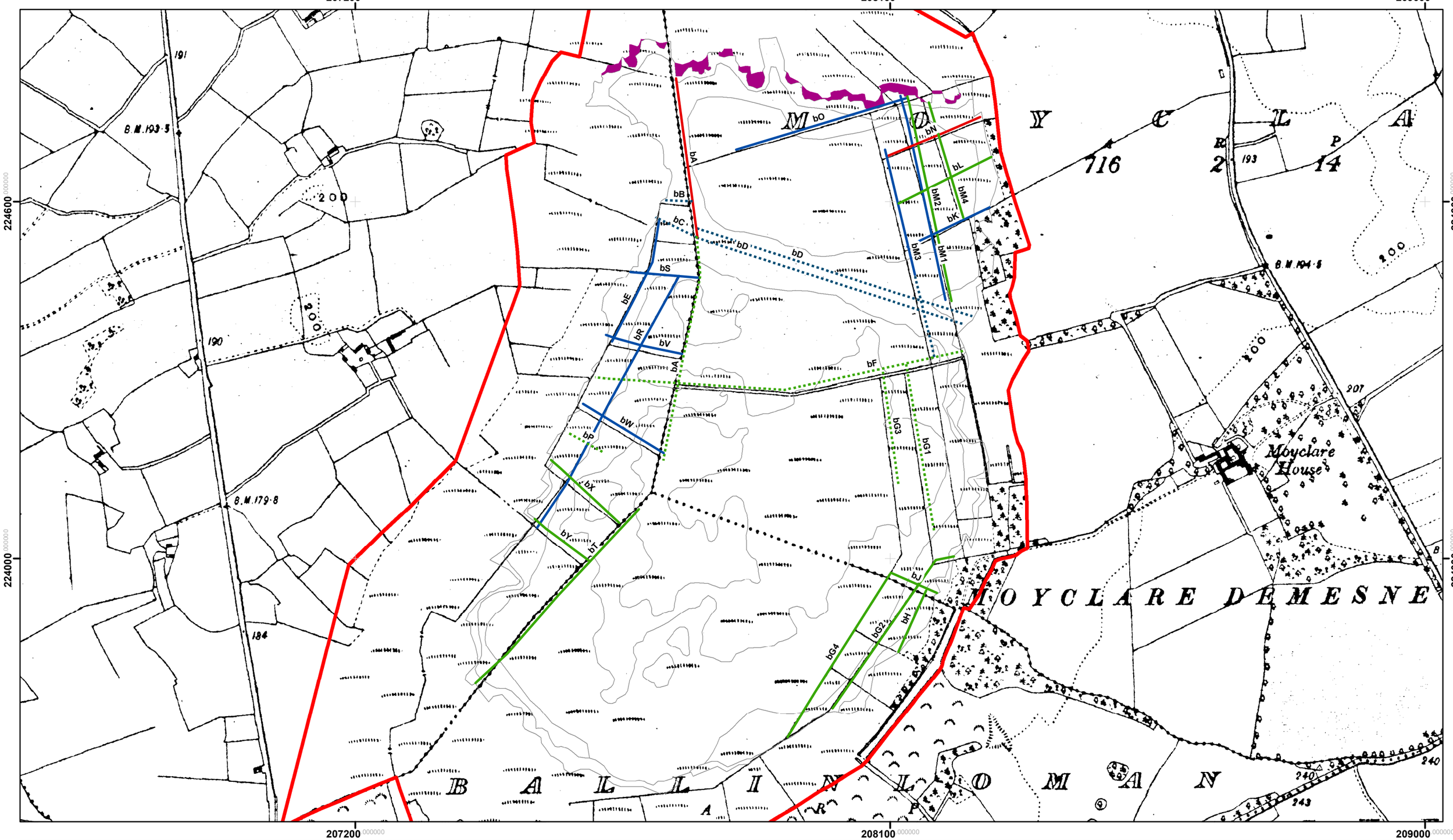
N

0 85 170 340 510 680 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.

Moyclare SAC (000581)
Co. Offaly

1:6,000

N

0 80 160 320 480 640 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