Sharavogue Bog (SAC 000585), Co. Offaly

Executive Summary

This survey, carried out in September 2011, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Sharavogue 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 25.78ha (18.82%) of the high bog area. The highest quality example of Active Raised Bog consists of *Sphagnum* lawns, hummocks and hollows. Pools are only occasionally found at Sharavogue Bog. *Sphagnum* cover ranges from 51 to 75%.

Degraded Raised Bog covers 111.23ha (81.18%) 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. The habitat also includes an inactive flush with scattered *Pinus sylvestris* trees.

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.

Restoration works took place at the site throughout the 1990's including the blocking of high bog drains and the cutover drains in the southeast. An initial failed attempt at drain blocking took place in 1992, but a successful one was undertaken in the 1994-1999 period. Fernandez *et al*. (2005) already reported considerable increases in Active Raised bog in the middle section of the high bog as a result of the drain blocking. No further increase in habitat area has been noted in the 2005-2011 reporting period.

The current conservation objective for Sharavogue 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 84.24ha. The objective in relation to Structure and Functions (S&Fs) is that at least half of the Active Raised Bog area should be made up of the central ecotope and active flush (i.e. the wetter vegetation communities). These values have been set as Favourable Reference Values or FRVs until more site specific values can be set based on hydrological and topographical studies. The objective for Degraded Raised Bog is for the sub-marginal area to be restored to active peat forming communities as stated above and that no loss or degradation of any kind occurs. Although FRVs could not be established for the Rhynchosporion depressions, the objectives are to increase its extent and improve its quality to values associated with a favourable conservation status of Active Raised Bog. Therefore, the habitat's objectives are indirectly associated with Active Raised Bog objectives.

There has been no change in the Area or the S&Fs of Active Raised Bog in the reporting period. Although, five new peat forming areas have been described at the site, these are the result of more comprehensive field mapping in 2011 and are believed to have been already present in 2005. Changes in some of the other Active Raised Bog sections have also been reported and are attributed to similar reasons.

Cutover drainage and reduced functional high bog drains are the highest impacting activities at the site. Peat cutting no longer takes place at the site. *Pinus sylvestris* and *Rhododendron ponticum* are found in some sections of the high bog. However, these do not seem to be spreading and thus are not deemed a major threat to high bog habitats. A mature *Pinus sylvestris* plantation is located to the north of the site. This plantation is outside the SAC boundary.

Active Raised Bog has been given an overall **Unfavourable Bad-Stable** conservation status assessment. Habitat Area and quality (S&Fs) are below favourable reference values. Future Prospects are considered Unfavourable Bad-Stable. Cutover areas may play a major role in the development of Active Raised Bog at Sharavogue Bog as the high bog may not be able to support the targeted FRV due to its current characteristics (i.e. small size and steep slopes caused by peat cutting and drainage).

Degraded Raised Bog has been given an overall **Unfavourable Bad-Improving** assessment. The quality (S&Fs) has improved in the reporting period.

Rhynchosporion depressions has been given an overall **Unfavourable Bad-Improving** conservation status assessment as there has been some increase in associated habitats (e.g. sub-marginal ecotope within Degraded Raised Bog), and no further drying of the high bog.

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

A series of **recommendations** have also been given, these include: further restoration works including blocking of the remaining functional cutover drains; further hydrological and topographical studies to ascertain more accurate FRVs and further botanical surveys on the high bog and cutover to assess the efficiency of restoration works.

Site identification

SAC Site Code	000585	**6" Sheet:**	OY: 38
Grid Reference:	E 204600 / N 198600	**1:50,000 Sheet:**	53
High Bog area (ha)[1]:	137.01ha		
Dates of Visit:	16 and 22/09/11		
Townlands:	Rathbeg, Ballyegan and Clonfree.		

Site location

Sharavogue Bog is located approximately 5km directly south of Birr, Co. Offaly. The Little Brosna River runs along the west edge of the bog. The site may be accessed from the Roscrea to Birr road (N62) from a small road which runs along the north of the east edge of the bog (Kelly *et al.*, 1995).

Ballyduff & Clonfinane Bogs (SAC 641) lies 5-6km to the northwest of Sharavogue and Firville & Kilcarren Bogs (SAC 647) 12-13km to the west-northwest.

Description of the survey

The survey was carried out in September 2011 and involved a vegetation survey of the high bog at Sharavogue 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.

1 This figure is slightly smaller than the one given in 2005, as a result of improvement on mapping accuracy; based on 2010 aerial photography.

The entire high bog of Sharavogue Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope 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.

The 2011 survey did not look at cutover. The survey of cutover would require a new methodology which would include assessments of cutover and lag zone vegetation, particularly to this site as restoration took place on cutover areas and improvements within these sections are expected.

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

Sharavogue Bog has an oval shape and a well-developed dome, which is relatively long and narrow. It is a medium sized bog that has been classified as a Ridge River Bog type (Kelly *et al*., 1995). According to Cross (1990) Sharavogue Bog is a True Midland Raised Bog.

Ecological information

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

The following Raised Bog EU Annex I habitats, are found in Sharavogue 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 Sharavogue Bog is 25.78ha (18.82% of the high bog), which is an increase of 2.15ha since 1994.

Active Raised Bog only consists of sub-central ecotope. The dominant micro-topography within this ecotope at Sharavogue Bog consists of *Sphagnum* hummocks and hollows. Pools are scarce and although *Sphagnum cuspidatum* filled lawn-like depressions are noted they are very occasional. The overall *Sphagnum* cover ranges from 51 to 75%. *Calluna vulgaris*, *Erica tetralix* and *Eriophorum vaginatum* dominate. Complex 10/9 is the wettest vegetation community complex within this ecotope and is characterised by the abundance of *Eriophorum vaginatum,* when this is replaced by *E. angustifolium* the complex is named 10/9a. The latter is generally slightly wetter than 10/9. Hummocks consist of *Sphagnum capillifolium, S. papillosum, S. magellanicum, S. tenellum, S. subnitens* and very occasionally *S. fuscum and S. austinii*. Hollows may contain *S. cuspidatum* and/or *S. tenellum*.

Complex 9/7/10 dominates the southern section of the high bog and consists of low *S. capillifolium* hummocks and hollows with *S. cuspidatum* in places. The overall *Sphagnum* cover is greater ranges from 34 to 50%.

The high bog also features scattered *Betula pubescens* and *Pinus sylvestris* trees.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Sharavogue Bog is 111.23ha (81.18% of the high bog).

Degraded Raised Bog includes the sub-marginal, marginal and face bank ecotope, as well as inactive flush. 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, with a higher presence of hummocks and hollows. Complex 9/7/6 is the most widespread sub-marginal ecotope complex and consists of *Sphagnum* hummocks and hollows. *Calluna vulgaris*, *Eriophorum vaginatum* and *Narthecium ossifragum* characterise this complex. *Sphagnum* hummocks consist of S*. capillifolium, S. papillosum, S. magellanicum*, *S. tenellum* and *S. subnitens*. *S. austinii* and *S. fuscum* hummocks are also found. *S. cuspidatum* is occasionally found within hollows. Pools are absent, but *Sphagnum* filled depressions are found where peat was dug out to build dams, as part of

the restoration project that involved the blocking of drains. The overall *Sphagnum* cover decreases and *Narthecium ossifragum* increases in the most degraded examples of sub-marginal ecotope.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow band near the margins of the high bog. Micro-topography consists of *C. vulgaris* hummocks, low *Sphagnum* hummocks, flats and very occasionally hollows. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (<10%) and the vegetation is characterised by higher cover of *N. ossifragum, T. germanicum, C. vulgaris* and *Carex panicea.*

Face bank ecotope is characterised by firm ground, tall *C. vulgaris*, poor *Sphagnum* cover and flat micro-topography. This complex is found at the drier edges of the high bog where peat cutting tool place in the past. *Sphagnum* cover is generally absent but could reach 5% in places.

Two inactive flushes are present on the northern section of the high bog.

The high bog also features scattered *Betula pubescens* and *Pinus sylvestris* trees.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Sharavogue Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. In these areas, the Rhynchosporion vegetation occurs along pool edges (very scarce in Sharavogue Bog), on lawns and hollows underlain by deep, wet and quaking peat. Typical plant species include *Rhynchospora alba, Sphagnum cuspidatum, S. magellanicum, S. papillosum, Drosera anglica* and *Eriophorum angustifolium*.

R. alba was also found within degraded raised bog, but always associated with wet features such as hollows, erosion channels and tear pools. In fact the species is found at higher cover values within sub-marginal and marginal ecotope community complexes at Sharavogue Bog, but these complexes cover relatively small areas, as already reported by Fernandez *et al*. (2005).

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2011 survey of Sharavogue 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 Sharavogue 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; see section 7):

Table 6.1 Impacting activities

Code	Activity	Ranking	Influence	Area (ha) /Length(km) affected	Location	Habitat affected
J02.07	Drainage	M	-1	21.912km [1]	On HB	**7110/7120/7150**
J02.07	Drainage	L	-1	n/av	Adjacent to HB	**7110/7120/7150**
I02	Problematic native species	L	-1	<0.1ha [3]	On HB	**7110/7120/7150**
B01.02	Artificial planting on open ground (non-native trees)	L	-1	Unknown	Adjacent to HB	**7110/7120/7150**
4.2	Restoring/Improving the hydrological regime	M	+1	21.912km [2]	On HB	**7110**
4.2	Restoring/Improving the hydrological regime	H	+1	21.912km [2]	On HB	**7120/7150**
4.2	Restoring/Improving the hydrological regime	M	+1	Unknown	Adjacent to HB	**7110**
4.2	Restoring/Improving the hydrological regime	H	+1	Unknown	Adjacent to HB	**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 (some of them blocked).

[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

Peat cutting no longer takes place at Sharavogue Bog and no high bog was lost to cutting during the reporting period. Cutting was already restricted to just four plots, all in the north-east of the site in 2005. However, old face banks and high bog and cutover drainage associated with past cutting continue to cause negative impacts on the high bog habitats.

Drainage

High bog drainage

The majority of drains in the high bog remain reduced functional (21.912km) after being blocked in a second attempt in 1994-1999 (see Map 3). Some of the reduced functional drains are still impacting on the high bog habitats and will continue to do so until they become completely in-filled and therefore thus non-functional.

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

Table 6.2 High bog drainage summary

Status	**2005 (km)** [1]	**2011 (km)**	**Change**
NB: functional	n/a	n/a	n/a
NB: reduced functional	n/a	n/a	n/a
NB: non- functional	0.046	0.046	0.000
B: functional	n/a	n/a	n/a
B: reduced functional	21.912	21.912	0.000
B: non- functional	n/a	n/a	n/a

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

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

Table 6.3 below provides a more detail description of the drainage present on the high bog at Sharavogue Bog including any change in their functionality in the 2005 – 2011 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2005 status	2011 status	Change	Comment
bA	18.301	B: reduced functional	B: reduced functional	No	Infilling taking place
bB	0.750	B: reduced functional	B: reduced functional	No	Infilling taking place
bB1	0.111	B: reduced functional	B: reduced functional	No	Infilling taking place
bC	0.317	B: reduced functional	B: reduced functional	No	Infilling taking place
bD	0.143	B: reduced functional	B: reduced functional	No	Infilling taking place
bE	1.191	B: reduced functional	B: reduced functional	No	Infilling taking place
bG	0.749	B: reduced functional	B: reduced functional	No	Infilling taking place
bH	0.182	B: reduced functional	B: reduced functional	No	Infilling taking place
bJ	0.168	B: reduced functional	B: reduced functional	No	Infilling taking place
bK	0.046	NB: non-functional	NB: non- functional	No	

Bog margin drainage

The cutover areas were not surveyed for drains during 2011.

Cutover drains along the south-eastern cutover were blocked in 1996/97. However, drains associated with old peat cutting to the northwest and northeast east remain functional and impacting on the high bog habitats.

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

Fire history

No evidence of fire events having taken place in the 2005 – 2011 period were noted in the 2011 survey. The last fire event recorded at the site took place in 1994.

Problematic native species

Some scattered scots pine trees (*Pinus sylvestris*) were reported in 2005 by Fernandez *et al*. (2005) in several locations on the high bog. To the west of the blocked drain complex bA (GR 205075/198557) a clump of up to 20 *P. sylvestris*, ranging from 0.4m to 2m was found near the drains. Some *Betula pubescens* trees were also present. These trees still remain on the high bog but are not spreading.

A *Rhododendron ponticum* specimen was also reported in 2005 located in the southern half of the high bog (GR 204786/198530). There are no seedlings or signs of regeneration.

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

Afforestation and forestry management

There is no forestry plantation on the high bog. A mature *Pinus sylvestris* plantation is located to the north of the site. This plantation is outside the SAC boundary. This activity is ranked as having low importance/impact.

Other impacting activities

No other significant impacting activities were noted or recorded in 2011 impacting high bog habitats in the 2005-2011 reporting period.

Conservation activities

Restoration works were carried out in Sharavogue Bog on two different occasions. These works involved the blocking drains in order to halt the loss of water and encourage the development of wetter vegetation and thus attempt to reactivate the growth of active peat forming vegetation.

A first attempt at blocking high bog drains was carried out in 1992. This attempt was considered unsuccessful and a second restoration project took place in the 1994-1999 period. These works included the blocking of high bog drains and cutover drains in the southeast. The Fernandez *et al*. (2005) survey highlighted the positive effects of these restoration works attributing the development of sub-central ecotope among drain complex bA in the middle section of the high bog to them. The 2005 survey also noted the regeneration of active peat forming vegetation on the southeast cutover (see Fernandez *et al*. (2005) for further detail).

The 2011 survey did not detect any major changes in Active Raised Bog in the 2005-2011 period (see section 8.1.

The NPWS has engaged in negotiation with landowners in relation to the purchase of cutover and high bog in the northeast corner of the site. A long term lease with the two landowners will come to an end in January 2012 and will not be renewed (Bugler pers. comm., 2011).

Both high bog and cutover drainage blocking are reported as positive management actions under Restoring/Improving the hydrological regime (4.2) within table 6.1. A high importance/impact on 7120 and 7150 habitats has been given as improvements on both habitats have taken place, whereas a medium importance/impact on 7110 habitat has been given, as no variation on its extent has been noted in the reporting period. Nevertheless, restoration works would have halted further habitat losses.

Conservation status assessment

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

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

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

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

Active Raised Bog (7110)

Area

Table 8.1 indicates that there has been no change in the area of Active Raised Bog in the reporting period (2005-2011).

Several new areas of sub-central ecotope (**Sc4** to **Sc8**) have been mapped in 2011. These areas are the result of more comprehensive surveying and accurate mapping in 2011, which resulted in an improved ecotope map. The more comprehensive survey has also shown some changes in **Sc1**, **Sc2** and **Sc3**. **Sc1** now consists of two separated sub-central sections and **Sc2** and **Sc3** are slightly larger than mapped in 2005 (see Map 1).

In addition to the newly recorded sub-central areas, other smaller pockets of sub-central ecotope have also been recorded during the 2011 survey within drain complex bA (see Map 2). These new active peat forming areas are too small to be mapped as sub-central ecotope polygons (in Map 1) and only sub-central ecotope complexes dots have been mapped (Map 2).

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central, sub-central ecotopes and active flush) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 84.24ha (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 (25.78ha) is 69.40% below the FRV. A current area value more than 15% below FRV falls into the **Unfavourable Bad** assessment category.

Active Raised Bog would not reach a favourable assessment until its area reaches the FRV. The current characteristics of the high bog at Sharavogue Bog (i.e. steep slopes caused by peat cutting and drainage) makes the development of the targeted Active Raised Bog FRV on the high bog difficult. Thus, cutover and particularly the eastern and northern cutover, could play an essential role in the development and expansion of Active Raised Bog at the site.

Although a long term (1994/5-2011) trend indicates an increase of the area of Active Raised Bog at the site (2.15ha) (see table 8.1). A more recent and short term trend analysis (6 years; 2005-2011) shows no change in its area. Therefore, the habitat Area is given a **Stable** trend assessment.

The Area of Active Raised Bog at Sharavogue Bog is assessed as Unfavourable Bad-Stable (see table 8.5).

Structure & Functions

The FRV for S&Fs is for at least half of the active raised bog area to be made up of central and active flush, i.e. the higher quality wetter vegetation communities. This value is 12.89ha (half of 25.78ha, the current area of Active Raised Bog). Currently there is no central or active flush vegetation at the site. A current value more than 25% below FRV falls into the **Unfavourable Bad** assessment category.

In the absence of central ecotope and active flush, S&Fs assessment trend is based on the change of sub-central ecotope. Although a long term (1994/5-2011) trend indicates an increase of the area of sub-central ecotope at the site (2.15ha) (see table 8.1). A more recent and short term trend analysis (6 years; 2005-2011) shows no change in its area. Therefore, S&Fs are given a **Stable** trend assessment.

Quadrats analysis (**Qsc2, Qsc3, Qsc4, Qsc5** and **Qsm1**) indicates the following:

Qsm1: this quadrat was previously classified as sub-central ecotope (Qsc1; complex 6/9+P). This is the result of vegetation reinterpretation rather than actual changes. There is a slight variation in the quadrat data: a slight increase in the cover of algae in hollows and the cover of algae in pools , a slight increase in the cover of *Sphagnum capillifolium*; a slight decrease in the cover of *S. austinii, S. papillosum, S. magellanicum, S, cuspidatum* and *Trichophorum germanicum*, a slight decrease in the overall *Sphagnum* pools, hummocks and hollows cover and in the overall *Sphagnum* cover. However, although the changes listed above suggest that there has been a slight decline in the quality of the vegetation within this quadrat, it should be noted that in 2005, Complex 6/9+P was already considered a borderline sub-central/sub-marginal complex. A description from 2005 of the more general area outside of the quadrat stated that "Many of these pools have an algal covering with a very low patchy cover of *Sphagnum cuspidatum* though most have a high cover of *S. papillosum* and *S. magellanicum* around their margins. Overall the *Sphagnum* cover is 30-40%... *Narthecium ossifragum* (25-30%) and *Eriophorum vaginatum* (15-20%) dominate the inter-pool vegetation along with *Calluna vulgaris* (15%), which grows to 0.3m in height" (Fernandez *et al*. 2005). This description corresponds with the findings of the 2011 survey. Furthermore, a detailed examination of the 2005 and 2010 ortho-images shows darker colours in the area surrounding Qsm1, indicating that this area has always been drier than the adjacent sub-central ecotope. Thus, no changes are likely to have taken place at this location.

Qsc2*:* Slight variation of quadrat data: slight decrease in hummocks and *Sphagnum* hollows cover, there is a slight decrease in *Trichophorum germanicum*, *Sphagnum papillosum* and *Rhynchospora alba* cover; slight increase in *Sphagnum* lawns cover and in *S. cuspidatum, S. capillifolium* and *Calluna*

vulgaris cover; *Sphagnum austinii* is now absent (but present adjacent to quadrat); *S. subnitens* and *Cladonia portentosa* are now present.

Qsc3: a slight variation of quadrat data: slight decrease in hummocks, *Sphagnum* hollows & lawns cover, there is a slight decrease in *Sphagnum magellanicum, S. cuspidatum* and *S. papillosum* cover; *S. fuscum* is now absent (but present adjacent to quadrat), *Narthecium ossifragum* is now absent; and there is a slight increase in *S. capillifolium* and *Calluna vulgaris* cover; *Rhynchospora alba* is now present.

Qsc4: a slight variation of quadrat data: bare peat and *Sphagnum* lawns now absent; there is a slight decrease in *Sphagnum* hollows cover, and in *Sphagnum austinii*, *S. fuscum*, *S. magellanicum, S. cuspidatum, S. papillosum* and *Narthecium ossifragum* cover; a slight increase in *Sphagnum capillifolium* and *Calluna vulgaris* cover; *Cladonia portentosa* is now present. These small changes are likely to be the result of observer variation and lack of precision in relocating of the quadrat (up to 2m) between both year surveys, rather than actual changes.

Qsc5: a slight variation of quadrat data: there is a slight decrease in hummocks cover, *Sphagnum* hollows cover, *Sphagnum papillosum* cover; a slight increase in *S. capillifolium, Rhynchospora alba* and *Calluna vulgaris* cover; *Cladonia portentosa* is now absent.

Some of the changes noted within the above quadrat may be the result of lack of precision in relocating of the quadrat (up to 2m) between both year surveys, rather than actual changes (see Appendix III).

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

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

Future Prospects

Habitat Area and S&Fs have not changed in the reporting period. Only high bog drainage is considered to have medium importance/impact on high bog habitats, and although 21.912km of drains remain reduced-functional and therefore having some negative influence on the habitat, in-filling continues to take place within them and they have all been blocked.

Habitat **Area** is currently 69.40% below FRV (see table 8.4) and a trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% below FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Stable**.

Habitat's **S&Fs** are currently 100% below FRV (see table 8.4). A Stable trend is also foreseen, and therefore **S&Fs** are expected to be more than 25% below FRV in the following two reporting periods. Habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Stable**.

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

Cutover areas (particularly the eastern and northern) should be considered for the restoration of the habitat as the current characteristics of the high bog (i.e. small size, steep slopes caused by cutting and drainage) may make it difficult to regenerate previous ARB Area values on the high bog. The blocking of the remaining functional cutover drains is recommended.

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994/5 [1]	2005 [2]	2005 (amended)	2011	Change (2005-2011)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-central	23.63	25.58	25.78	25.78	0.00	0.00
Total	**23.63**	**25.58**	**25.78**	**25.78**	**0.00**	**0.00**

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

[2] 2005 figures have been slightly modified based on a more accurately mapped high bog boundary undertaken as part of this project. This has mostly affected face bank ecotope figures.

[3] This figure includes 0.23ha of Active flush considered to be sub-central ecotope

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 2011. The comparison between 2005 (amended) and 2011 illustrates the actual changes in ecotope area in the 2005-2011 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 2011 (see table 8.2 for further detail).

Table 8.2 Assessment of changes in individual Active Raised Bog areas

Area	Quadrats	Trend	Comment	Quadrats analysis
Sc1	Qsc2,Qsc3, Qsc4&Qsc5	Stable	Sc1 currently consists of two separated sections. This change is likely to be the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.	**Qsc2:** slight decrease in hummocks and *Sphagnum* hollows cover, *Trichophorum germanicum*, *Sphagnum papillosum* and *Rhynchospora alba* cover; slight increase in

				Sphagnum lawns cover, *S. cuspidatum, S. capillifolium, Calluna vulgaris* cover; *S. austinii* now absent (but present adjacent to quadrat); *Cladonia portentosa* and *S. subnitens* now present. **Qsc3:** slight decrease in hummocks, *Sphagnum* hollows & lawns cover, *Sphagnum magellanicum, S. cuspidatum, S. papillosum* cover; *S. fuscum* now absent (but present adjacent to quadrat), *Narthecium ossifragum* now absent; slight increase in *S. capillifolium, Calluna vulgaris* cover; *Rhynchospora alba* now present. **Qsc4**: bare peat and *Sphagnum* lawns now absent; slight decrease in *Sphagnum* hollows cover, *Sphagnum austinii, S. fuscum, S. magellanicum, S. cuspidatum, S. papillosum, Narthecium ossifragum* cover; slight increase in *S. capillifolium, Calluna vulgaris* cover; *Cladonia portentosa* now present. **Qsc5:** slight decrease in hummocks cover, *Sphagnum* hollows cover, *Sphagnum papillosum* cover; slight increase in *S. capillifolium, Rhynchospora alba, Calluna vulgaris* cover; *Cladonia portentosa* now absent.
Sc2	None	Stable	Slightly larger than mapped in	

			2005. This change is the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.
Sc3	None	Stable (possibly expanding)	Slightly larger than mapped in 2005. This change is likely to be the result of more comprehensive surveying in 2011 which resulted in more accurate mapping. However, this section may be also expanding (not enough evidence to confirm this).
Sc4	None	Unknown	This specific area was not surveyed in 2005. This is likely to be the result of more comprehensive surveying in 2011 which resulted in more accurate mapping.
Sc5	None	Unknown	As above
Sc6	None	Unknown	As above
Sc7	None	Unknown	As above
Sc8	None	Unknown	As above

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 52.77ha at Sharavogue Bog. This value corresponds with the difference between the current high bog area (137.01ha) and Active Raised Bog FRV (84.24ha) 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 110.78% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3 indicates that there has been no change in the Area of Degraded Raised Bog. Therefore the habitat is given a **Stable** trend.

The Area of Degraded Raised Bog at Sharavogue Bog is assessed as Unfavourable Bad-Stable (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 27.81ha (25% of 111.23ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (27.82ha) is considered to be similar to 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). Thus S&Fs are assessed as **Favourable**.

As table 8.4 indicates, the area of marginal ecotope has decreased by 2ha while the area of sub-marginal ecotope has increased by approximately 2ha along eastern and western sections of the high bog (within drain complex bA) most likely as a result of the blocking of drains. These areas were noted as being much wetter than the surrounding ground. Any other changed in the area of sub-marginal ecotope is considered to be the result of a more comprehensive surveying and accurate mapping in 2011. 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 Sharavogue Bog are given an **Improving** trend.

The Structure & functions of Degraded Raised Bog at Sharavogue Bog are assessed as Favourable-Improving as a result of the decrease of marginal ecotope and expansion of sub-marginal (see table 8.5).

Future Prospects

Restoration works have had a very positive effect on the habitats S&Fs and are likely to continue in the future, despite certain impacting activities (e.g. cutover drains) still negatively impacting the habitat. Habitat **Area** is currently 110.78% above FRV (see table 8.4) and a Stable trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Stable**. Habitat's **S&Fs** are currently similar to FRV (see table 8.4). An Improving trend is foreseen in the following two reporting periods, **S&Fs** are expected to remain equal or below FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Favourable-Improving**.

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

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	1994/5 [1]	2005 [2]	2005 (amended)	2011	Change (2005-2011)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Sub-marginal	60.61	66.77	80.00	82.00	(+)2.00	(+)2.5
Marginal	53.47	41.35	27.66	25.66	(-)2.00	(-)7.23
Face bank	Na	2.16	2.16	2.16	0.00	0.00
Inactive flush	0.17	1.15	1.41	1.41	0.00	0.00
Total	**114.25**	**111.43**	**111.23**	**111.23**	**0.00**	**0.00**

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

[2] 2005 figures have been slightly modified based on a more accurately mapped high bog boundary undertaken as part of this project. This has mostly affected face bank ecotope figures.

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 2011. The comparison between 2005 (amended) and 2011 illustrates the actual changes in ecotope area in the 2005-2011 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 2011.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchospora alba is found in high densities in parts of the sub-marginal and marginal ecotopes at Sharavogue Bog, particularly in areas with tear pools and erosion channels. These high density areas cover a small portion of the high bog. More stable and better quality such as *Sphagnum* dominated pools, lawns and hollows are of higher value and more desirable from an overall high bog habitats conservation perspective. These features are typically found on Active Raised Bog.

Kelly *et al*. (1995) described in 1994 a dominance of *R. alba* and *Narthecium ossifragum* with large amounts of bare peat and *Campylopus introflexus* at the site associated with regular burning in the 1990's. Although burning may have encouraged higher species density in the past this activity does not benefit Active Raised Bog which is a priority habitat compared to Rhynchosporion depressions and therefore is not desirable. Fernandez *et al*. mentioned a decrease in *R. alba* cover in the previous

reporting period attributing it to the increased wetness of the high bog after the blocking of drains and the recovery of the vegetation from burning. No major changes are likely to have occurred in the new 2005-2011 period.

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 sub –marginal ecotope has slightly increased in the reporting period and Active Raised Bog has remained unchanged. As result habitat Area is given an **Increasing** 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. Restoration works are likely to continue to positively affect the habitat in the future despite the occurrence of certain activities (e.g. cutover drainage) still negatively impacting the high bog habitats. Therefore, the habitat's Area Future Prospects are given an **Unfavourable Bad**-**Increasing** 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**-**Stable** assessment.

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

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

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment	Structure & Functions Assessment

	FRV Target (ha) [1]	2011 value (ha) [2]	% below target	FRV 2011 Target (ha) [3]	2011 value (ha) [4]	% below target
7110	84.24	25.78	69.40	12.89	0.00	100

[1] 1992 central, sub-central, active flush, bog woodland and sub-marginal ecotope area.
[2] 2011 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] 2011 central ecotope and active flush area.

	FRV Target (ha) [5]	2011 value (ha) [6]	% above target	FRV 2011 Target (ha) [7]	2011 value (ha) [8]	% above target
7120	52.77	111.23	110.78	27.81	27.82	0.04

[5] 1992 high bog area minus 7110 area FRV.
[6] 2011 Degraded Raised Bog area.
[7] 25% of the current Degraded Raised Bog habitat area. The target is that the extent of marginal and face bank ecotopes should not be larger than 25% of the current Degraded Raised Bog habitat area.
[8] Current marginal and face bank ecotopes area.

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

- **Active Raised Bog is assessed as being Unfavourable Bad-Stable**. Note: The habitat was given a favourable assessment in 2005. The methodology used in 2005 was based on the comparison of 1994/5 and 2005 values rather than on setting FRVs. Habitat Area value was also below FRV in 2005 and therefore using the 2011 assessment criteria, the assessment would also have been Unfavourable Bad in 2005.
- **Degraded Raised Bog is assessed as being Unfavourable Bad–Improving.**
- **Rhynchosporion depressions is assessed as being Unfavourable Bad–Improving.**

Table 8.5 Habitats conservation status assessments

Habitat	Area Assessment	Structure & Functions Assessment	Future Prospects Assessment	Overall Assessment
7110	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Stable	Unfavourable Bad-Stable
7120	Unfavourable Bad-Stable	Favourable-Improving	Unfavourable Bad-Improving	Unfavourable Bad-Improving
7150	Unfavourable Bad-Increasing	Unfavourable Bad-Stable	Unfavourable Bad-Improving	Unfavourable Bad-Improving

Conclusions

Summary of impacting activities

There have been no major changes in the intensity or influence of impacting activities:

- Peat cutting is no longer present at the site. However, open face banks may still continue to drain the high bog.
- Only reduced functional drains remain on the high bog, all of these have been blocked, but are still considered to have some negative influence on the high bog habitats and will continue to do so until they have become completely in-filled. Overall, the high bog drains have continued to infill.
- Cutover drains to the south-east were blocked in 1996/97 and infilling has taken place. However, cutover drains associated with old peat cutting to the northwest and northeast east remain functional and impacting on the high bog habitats.
- No fire events have damaged the high bog in the reporting period.
- *Pinus sylvestris* and *Rhododendron ponticum* although present across some sections of high bog do not seem to have spread in the reporting period and are not considered a major threat.
- A mature *Pinus sylvestris* plantation is located to the north of the site. This plantation is outside the SAC boundary.

Changes in active peat forming areas

- Five new peat forming areas (**Sc4** to **Sc8**) have been described at the site (see table 8.2). These new sub-central ecotope areas are the result of a more comprehensive surveying and accurate mapping in 2011 rather than actual changes in vegetation.
- A more comprehensive surveying and mapping has also shown some changes in **Sc1**, **Sc2** and **Sc3**. **Sc1** now consists of two separated sub-central sections and **Sc2** and **Sc3** are slightly larger than mapped in 2005.

Other changes

- The new ecotope map (Map 1) shows some changes in the width of marginal ecotope at the edges of the high bog. Only those to the east and west within the blocked drain complex bA are considered to correspond with actual changes in vegetation, in this case associated with further re-wetting processes after blocking of drains. Any other change within marginal ecotope is deemed to be the result of a more accurate mapping in 2011.

Quadrats analysis

- Former quadrat **Qsc1 (**sub-central) is now considered to correspond with sub-marginal ecotope. This is the result of vegetation re-interpretation, rather than any actual change in vegetation.
- Quadrat analysis shows slight changes in many of the quadrats. Although high accuracy GPS equipment was used during the 2005 and 2011 surveys, the devises still only allow up to 0.5m accuracy (after post-processing). The lack of precision in relocating of the quadrat may justify certain differences in the vegetation described. Permanent markers were inserted into quadrats recorded in 2011.

Conservation measures

- Restoration works were carried out in Sharavogue Bog on two different occasions (1992 and 1994-1999). These works involved the blocking of high bog drains and southeast cutover drains.
- Development of Active Raised Bog on the middle section of the high bog within drain complex bA was reported by Fernandez *et al*. (2005). The regeneration of active peat forming vegetation on the southeast cutover was also mentioned. The new 2011 survey did not detect any major changes in Active Raised Bog in the 2005-2011. Therefore, this indicates that the biggest improvements in high bog vegetation, as a result of the blocking of drains, took place in the 1994/95 – 2005 period. Nonetheless, sub-marginal ecotope has

expanded in the new reporting period indicating the positive effects of the restoration works.

- The NPWS has engaged in negotiation with landowners in relation to the purchase of cutover and high bog in the northeast corner of the site. A long term lease with the two landowners will come to an end in January 2012 and will not be renewed, (Bugler pers. comm., 2011).

Summary of conservation status

- **Active Raised Bog** has been given an overall **Unfavourable Bad-Stable** conservation status at Sharavogue Bog. Neither habitat Area nor quality (S&Fs) have varied in the reporting period, and both values are below the FRVs. Future Prospects are considered Unfavourable Bad-Stable. Cutover areas may play a major role in the development of Active Raised Bog at Sharavogue Bog as the high bog may not be able to support the targeted FRV due to its current characteristics (i.e. small size and steep slopes caused by peat cutting and drainage). The habitat was given a Favourable status assessment in 2005. However, using the 2011 assessment methodology (based on setting FRVs), the assessment would also have been Unfavourable Bad in 2005.
- **Degraded Raised Bog** has been given an overall **Unfavourable Bad-Improving** conservation status at Sharavogue Bog. Habitat Area has not changed in the reporting period. However, the quality (S&Fs) has improved as a result of re-wetting associated with the blocking of drains. This is illustrated by increase in sub-marginal ecotope at the expense of marginal ecotope. Habitat Area is above the FRV and S&Fs below FRV. Future Prospects are considered Unfavourable Bad-Improving.
- **Depressions on peat substrates of the Rhynchosporion** has been given an overall **Unfavourable Bad-Improving** conservation status at Sharavogue Bog. Habitat Area is considered to have increased and quality (S&Fs) remained unchanged in the reporting period. Future Prospects are considered Unfavourable Bad-Improving.

The conservation status of the **overall raised bog** at **Sharavogue SAC** is assessed as being **Unfavourable Bad–Improving**.

Recommendations

- **Further restoration works:** blocking of any remaining functional cutover drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.

- **Further botanical monitoring surveys** both on the high bog and cutover in order to assess the effectiveness of restoration works.

References

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

Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Sub-Central Ecotope Complexes

COMPLEX 10/9

- **Location**: this complex is found to the east of **Sc1** and also dominating **Sc7**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat
- **Pools**: absent but with *Sphagnum cuspidatum* filled lawn-like depressions 4-10%
- ***Sphagnum* cover**: 51-75%
- ***Narthecium* cover**: <4%
- **Micro- topography**: High hummocks/hollows/depressions
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Sphagnum capillifolium* (Hummocks (H); 26-33%), *S. papillosum* (H; 4-10%), *S. magellanicum* (H; 4-10%), *S. tenellum* (H; 4-10%), *S. subnitens* (H; <4%), *S. austinii* (active H; 4-10%), *S. fuscum* (H; <4%), *S. cuspidatum* (Hollows (Hl); 4-10%).
- **Additional comments**: This complex is termed 10/9a where *Eriophorum angustifolium* becomes more dominant than *E. vaginatum*. It dominates **Sc6** and is also found within **Sc1**.

  A 'new' area of sub-central ecotope (**Sc7**) consisting of complex 10/9 is found along the eastern section of High Bog (GR 205019/198689/. This area was likely to have been missed in the 2005 survey. Here vegetation consists of *Sphagnum papillosum. S. austinii, S capillifolium* hummocks along with *S. cuspidatum* hollows. *Eriophorum angustifolium* cover is high (25-33%) as well as *Erica tetralix* (25-33%). The overall *Sphagnum* cover is 33 to 50%. The south-western section features lower *E. angustifolium* cover and more *Narthecium ossifragum* and *Rhynchospora alba* (<4%).

Quadrat **Qsc3** was recorded within this complex at **Sc1**.

COMPLEX 9/10

- **Location**: this complex dominates **Sc2, Sc3** and **Sc5**; although found within northern section of **Sc1** southern lobe it dominates the northern lobe.
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat/gentle slope
- **Pools**: <4% (4-10% in places)
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: <4% (4-10% in places)
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Trichophorum germanicum (*<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 26-33%), *S. magellanicum* (H; <4%), *S. tenellum* (H; <4%), *S. austinii* (active H; <4%), *S. fuscum* (H; <4%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments**: The cover of *Rhynchospora alba* increases (4-10%) where the pool cover increases. This complex within **Sc2** grades into the sub-marginal complex 9/7/6 and, indeed, there are small patches of this sub-marginal complex within the complex 9/10. There are two small flush areas within this complex. Both of these flush areas support a number (<5) *Pinus sylvestris* of ca 3m in height as well as some seedlings, *Betula pubescens*, *Vaccinium oxycoccos*, *V. myrtillus* and *Aulacomnium palustre*.

  This complex is also found in between areas of the blocked drains (**Sc1**). The *Sphagnum* cover in this area is generally 51-75% and the cover of active hummocks of S. *austinii* is 4-10%.

  Complex 9/10 is also found dominating **Sc3**. Here this sub-central ecotope is some sort of artificial as the highest *Sphagnum* cover occurs where peat has been extracted to create peat dams as part of the restoration project. *Sphagnum cuspidatum*, *Eriophorum vaginatum* and *E. angustifolium* dominate within these artificial depressions. Although overall *Sphagnum* cover is 50-75%, some areas within **Sc3**, particularly adjacent to blocked drains and with lower ground, contain higher *Sphagnum* cover and *Sphagnum capillifolium* hummocks become frequent. On the

other hand, some small patches with Sc3 are sub-marginal ecotope. The southern section of Sc3 was not drained and here 9/10 complex consists of *S. capillifolium* hummocks and *S. cuspidatum* hollows.

Quadrats **Qsc2** and **Qsc4** were recorded within this complex at **Sc1**.

COMPLEX 9/7/10

- **Location**: this complex dominates **Sc8** and southern **Sc1** lobe and is also found within southern section of northern **Sc1** lobe
- **Ground**: soft
- **Physical indicators**: absent (bare peat <4% in places)
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10% (<4% in places)
- **Macro-topography**: flat/gentle slope
- **Pools**: absent (but with *Sphagnum* filled depressions 4-10% in places)
- ***Sphagnum* cover**: 34-50%
- ***Narthecium* cover**: <4%
- **Micro- topography**: High and low hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<4%), *Sphagnum capillifolium* (H; 26-33%), *S. papillosum* (H; 11-25%), *S. magellanicum* (H; <4%), *S. tenellum* (H; <4%), *S. austinii* (active H; <4%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments**: This complex grades into the sub-marginal complex 9/7/4 towards the south where there is an increase in the cover of *Rhynchospora alba* (11-25%).
  Part of this complex was found in an area (**Sc8**) that was not surveyed in 2005.

Quadrat **Qsc5** was recorded within this complex at **Sc1**.

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7

- **Location**: this complex is found across the entire sub-marginal ecotope at the site, but it becomes more common across the southern section
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat
- **Pools**: absent (but with *Sphagnum* filled depressions 4-10% in places)
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 4-10% (<4% in places)
- **Micro- topography**: High hummocks/hollows
- **Tussocks**: *Eriophorum vaginatum* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H & Hl; 4-10%), *S. magellanicum* (Hl; <4%), *S. tenellum* (H; <4%), *S. austinii* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments**: none

COMPLEX 9/7/6

- **Location**: this is the most widespread sub-marginal complex at the site. It is replaced by 9/7 in the southern section.
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent (but in parts where dams were excavated there are artificial pool-like features filled with *Sphagnum cuspidatum* and *Eriophorum angustifolium*)

- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (<4%), *Andromeda polifolia* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments**: none

COMPLEX 9/7/4

- **Location**: this complex is found to the southeast of high bog
- **Ground**: soft and very wet
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat
- **Pools**: tear pools 4-10%
- ***Sphagnum* cover**: 26-33%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Low hummocks/hollows and tear pools
- **Tussocks**: *Eriophorum vaginatum* (4-10%) and *Trichophorum germanicum (*<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (11-25%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (11-25%), *Andromeda polifolia* (<4%), *Trichophorum germanicum (*<4%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. magellanicum* (H; <4%), *S. austinii* (H; <4%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments**: Quadrat **Qsm1** was recorded within complex 9/7/4. Qsm1 similar to 2005 but was then classed as Qsc1 (i.e. most likely no real change, merely a reclassification).

COMPLEX 7/6/4

- **Location**: this complex dominates the eastern section of sub-marginal ecotope at the site

- **Ground**: soft and very wet
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: steep slope towards high bog margin
- **Pools**: absent (but where dams were excavated there are artificial pool-like features filled with *Sphagnum cuspidatum* and *Eriophorum angustifolium*)
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 11-25%
- **Micro- topography**: Low hummocks/hollows and run off channels
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (11-25%), *Andromeda polifolia* (<4%), *Carex panicea* (<4%), *Trichophorum germanicum (*4-10%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4%), *S. subnitens* (H; <4%), *S. austinii* (active H; <4%), *S. cuspidatum* (Hl; 4-10%).
- **Additional comments**: In parts of this complex there is a very steep slope towards the high bog margin. Heading towards the margin there are run-off channels colonised by a high cover of *Rhynchospora alba*. However, where the slope is less severe there are active hummocks of *Sphagnum austinii* (<10cm in height) scattered about. The complex also features tear pools in patches (7/6/4 + TP). These tear pools are mainly colonised by *Rhynchospora alba* with a patchy cover of *Sphagnum cuspidatum* and algae.

COMPLEX 7/6

- **Location**: this complex is found along the southeast section of high bog
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle
- **Pools**: absent (but where dams were excavated there are artificial pool-like features with *Sphagnum cuspidatum* and *Eriophorum angustifolium*)
- ***Sphagnum* cover**: 11-25%

- ***Narthecium* cover**: 26-33% (34-50% in places)
- **Micro- topography**: High hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (26-33%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 4-10%), *S. cuspidatum* (Hl; <4%).
- **Additional comments**: none

Marginal Ecotope Complexes

COMPLEX 6/7

- **Location**: this complex is found along the entire high bog marginal ecotope
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 26-33% (34-50% in places)
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (26-33%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments**: where *Carex panicea* becomes abundant complex is named 6/7/3.

COMPLEX 7/2

- **Location**: this complex is found along entire high bog margin near the edge
- **Ground**: firm
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm

- ***Cladonia* cover**: 4-10%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: <4%
- ***Narthecium* cover**: 4-10%
- **Micro-topography**: low hummocks/hollows/tussocks
- **Tussocks**: *Trichophorum germanicum* (4-10%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (4-10%), *Rhynchospora alba* (<4%), *Sphagnum capillifolium* (H; <4%), *S. papillosum* (H; <4%).
- **Additional comments**: none

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat variable
- ***Calluna* height**: <50cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: generally absent but <5% in places
- ***Narthecium* cover**: absent
- **Micro- topography:** absent
- **Tussocks:** absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Molinia caerulea* (<4%), *Trichophorum germanicum* (<1%), *Hypnum jutlandicum (<4%), Hylocomium* splendens (<1%).
- **Additional comments**: none

Inactive Flushes

FLUSH Z (FZ)

- **Location:** north
- **Ground:** soft
- **Physical indicators:** absent
- ***Calluna* height:** 31-40cm (but up to 70cm)
- ***Cladonia* cover:** 11-25%
- **Macro-topography:** flat
- **Pools:** absent
- ***Sphagnum* cover:** 26-33%
- ***Narthecium* cover:** 11-25%
- **Micro-topography:** high hummocks
- **Tussocks:** absent
- **Degradation or regeneration evidence:** absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (4-10%), *Eriophorum vaginatum* (4-10%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (4-10%), *Sphagnum capillifolium* (H; 11-25%), *S. papillosum* (H; 11-25%), *S. tenellum* (H; <4%), *S. cuspidatum* (Hl; <4%),
- **Additional comments**: scattered *Pinus sylvestris* trees dominate this flush. *Molinia caerulea, Polytrichum alpestre, Potentilla erecta, Dryopteris dilatata, Vaccinium myrtillus* and *Aulacomnium palustre* hummocks were also found.

Depressions on peat substrates of the Rhynchosporion (7150)

The habitat occurs at Sharavogue Bog in both Active and Degraded Raised Bog, but it is only frequently found on degraded habitat. Only *Rhynchospora alba* was recorded within the 2011 survey at this site.

R. alba is found in all ecotopes except the face bank in Sharavogue Bog, such as: sub-central ecotope (10/9; 9/10; 9/7/10); sub-marginal ecotope (9/7; 9/7/4; 9/7/6; 7/6/4; 7/6/4+TP) and marginal ecotope (7/2), as well within inactive flush Z.

The species becomes very frequent within complexes 9/10 (sub-central ecotope), particularly where the pools cover increases and within 9/7/4, 7/6/4 and 7/6/4+TP (sub-marginal).

The species is always found associated with wet features such as *Sphagnum* pools, *Sphagnum* lawns and hollows, along with *Sphagnum magellanicum, S. papillosum*, *S. cuspidatum*. It was also found within *Narthecium ossifragum* dominated hollows in sub-marginal and marginal ecotope complexes. *R. alba* was also recorded in more degraded areas of Sharavogue Bog such as steep slope sections at

the edge of the bog where bare peat and erosion channels are found. In fact the highest species' density is found within sub-marginal and marginal ecotope community complexes, but these complexes cover relatively small areas, as already described by Fernandez *et al.* (2005).

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
102-0456	SE	Overview	Qsc2	16/09/2011
102-0457	W	Overview	Qsc3	16/09/2011
102-0458	E	Overview	Qsm1 (previously Qsc1)	16/09/2011
102-0459	NE	Overview	Qsc4	16/09/2011
102-0460	W	Overview	Qsc5	16/09/2011

Appendix III Quadrats

Ecotope type	Sub-central	Sub-marginal	Sub-central	Sub-central
Complex Name	**6/9+P**	**9/7/4**	**10/2**	**9/10**
Quadrat Name	Qsc1	Qsm1	Qsc2	Qsc2
Easting	204895	204897	204896	204897
Northing	198232	198233	198524	198522
Firmness	Soft	Soft	Soft	Soft
Burnt	No	No	No	No
Algae in hollows %	4-10	11-25	Absent	Absent
Algae in pools %	4-10	11-25	Absent	Absent
Bare peat %	Absent	1-3 (many indiv)	Absent	1-3 (many indiv)
High hummocks %	na	4-10	na	11-25
Low hummocks %	26-33	26-33	26-33	11-25
Hollows %	4-10	4-10	4-10	4-10
Lawns %	Absent	Absent	4-10	11-25
Pools %	4-10	4-10	Absent	Absent
Pool type	Regular	Tear	Absent	Absent
S.austinii hum type	na	Active	na	Absent
S.austinii hum %	4-10	1-3 (many indiv)	4-10	Absent
S.austinii height(cm)	na	11-20	na	Absent
S.fuscum hum type	Absent	Absent	Absent	Absent
S.fuscum hum %	Absent	Absent	Absent	Absent
S.fuscum height(cm)	Absent	Absent	Absent	Absent
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Tussocks	Tussocks	Tussocks	Tussocks
Trichophorum %	4-10	1-3 (many indiv)	4-10	1-3 (many indiv)
S.magellanicum %	4-10	1-3 (many indiv)	Absent	Absent
S.cuspidatum %	4-10	1-3 (many indiv)	4-10	11-25
S.papillosum %	11-25	4-10	11-25	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	4-10	11-25	4-10	11-25

S.tenellum %	na	1-3 (many indiv)	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	1-3 (many indiv)
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	4-10	11-25	4-10	1-3 (many indiv)
N.ossifragum %	4-10	4-10	4-10	4-10
Sphag pools %	4-10	1-3 (many indiv)	Absent	Absent
Dominant pool Sphag	S. cuspidatum	S. cuspidatum	S. cuspidatum	
Sphag lawns %	Absent	Absent	4-10	11-25
Sphag humm %	26-33	11-25	26-33	26-33
Sphag holl %	4-10	1-3 (many indiv)	4-10	1-3 (many indiv)
Total Sphag %	34-50	26-33	34-50	34-50
Hummocks indicators	S. austinii	S. austinii	S. austinii	Absent
Cladonia portent %	4-10	4-10	Absent	4-10
Other Cladonia sp	Absent		Absent	
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	11-25	11-25	11-25	26-33
Calluna height(cm)	21-30	11-20	21-30	31-40
Other NotableSpecies		Erica tetralix particularly abundant		Campylopus introflexus
Other comment		This Q was incorrectly classified as SC previously	Wetter	S. austinii 2m from quadrat
Date	**09/03/2005**	**16/09/2011**	**09/03/2005**	**16/09/2011**

Ecotope type	**Sub-central**	**Sub-central**	**Sub-central**	**Sub-central**
Complex Name	**10/9**	**10/9**	**9/10**	**9/10**
Quadrat Name	Qsc3	Qsc3	Qsc4	Qsc4
Easting	204865	204863	204945	204945
Northing	198479	198480	198095	198093
Firmness	Very soft	Very soft	Soft	Soft
Burnt	No	No	No	No
Algae in hollows %	Absent	Absent	Absent	Absent

Algae in pools %	Absent	Absent	Absent	Absent
Bare peat %	Absent	Absent	4-10	Absent
High hummocks %	na	26-33	na	11-25
Low hummocks %	34-50	11-25	34-50	34-50
Hollows %	11-25	4-10	11-25	11-25
Lawns %	26-33	11-25	4-10	Absent
Pools %	Absent	Absent	Absent	Absent
Pool type	Absent	Absent	Absent	Absent
S.austinii hum type	na	Active	na	Active
S.austinii hum %	4-10	4-10	4-10	1-3 (many indiv)
S.austinii height(cm)	na	31-40	na	21-30
S.fuscum hum type	na	Absent	na	Active
S.fuscum hum %	4-10	Absent	4-10	1-3 (many indiv)
S.fuscum height(cm)	na	Absent	na	11-20
Leucobryum glaucum	Absent	Absent	Absent	Absent
Trichophorum type	Absent	Absent	Absent	Absent
Trichophorum %	Absent	Absent	Absent	Absent
S.magellanicum %	11-25	1-3 (many indiv)	4-10	1-3 (many indiv)
S.cuspidatum %	4-10	1-3 (many indiv)	4-10	1-3 (many indiv)
S.papillosum %	11-25	4-10	11-25	4-10
S.denticulatum %	Absent	Absent	Absent	Absent
S.capillifolium%	11-25	26-33	26-33	34-50
S.tenellum %	na	4-10	na	1-3 (many indiv)
S.subnitens %	Absent	Absent	Absent	Absent
R.fusca %	Absent	Absent	Absent	Absent
R.alba %	Absent	1-3 (many indiv)	4-10	4-10
N.ossifragum %	4-10	Absent	4-10	1-3 (many indiv)
Sphag pools %	Absent	Absent	Absent	Absent
Dominant pool Sphag	S. cuspidatum		S. cuspidatum	
Sphag lawns %	26-33	11-25	4-10	Absent
Sphag humm %	34-50	34-50	34-50	34-50
Sphag holl %	11-25	1-3 (many indiv)	11-25	4-10
Total Sphag %	51-75	51-75	51-75	51-75

Hummocks indicators	S. austinii & S. austinii	S. austinii	S. austinii & S. fuscum	S. austinii & S. fuscum
Cladonia portent %	4-10	4-10	Absent	4-10
Other Cladonia sp	Absent		Absent	
C. panicea %	Absent	Absent	Absent	Absent
Calluna cover %	11-25	26-33	11-25	26-33
Calluna height(cm)	21-30	31-40	11-20	21-30
Other NotableSpecies	V. oxycoccos	V. oxycoccos	0.1	
Other comment	Wetter	S. fuscum adjacent to Q; S. austinii growing spreading low hummocks <10cm		
Date	**09/03/2005**	**16/09/2011**	**09/03/2005**	**16/09/2011**

Ecotope type	**Sub-central**	**Sub-central**
Complex Name	**9/7/10**	**9/7/10**
Quadrat Name	Qsc5	Qsc5
Easting	204977	204977
Northing	197802	197801
Firmness	Soft	Very soft
Burnt	No	No
Algae in hollows %	Absent	Absent
Algae in pools %	Absent	Absent
Bare peat %	Absent	Absent
High hummocks %	Na	11-25
Low hummocks %	51-75	34-50
Hollows %	11-25	11-25
Lawns %	Absent	Absent
Pools %	Absent	Absent
Pool type	Absent	Absent
S.austinii hum type	Absent	Active
S.austinii hum %	Absent	1-3 (many indiv)
S.austinii height(cm)	Absent	0-10

S.fuscum hum type	Absent	Absent
S.fuscum hum %	Absent	Absent
S.fuscum height(cm)	Absent	Absent
Leucobryum glaucum	Absent	Absent
Trichophorum type	Absent	Absent
Trichophorum %	Absent	Absent
S.magellanicum %	Absent	Absent
S.cuspidatum %	Absent	Absent
S.papillosum %	4-10	1-3 (many indiv)
S.denticulatum %	Absent	Absent
S.capillifolium%	34-50	51-75
S.tenellum %	Na	4-10
S.subnitens %	Absent	Absent
R.fusca %	Absent	Absent
R.alba %	1-3 (several indiv)	4-10
N.ossifragum %	Absent	Absent
Sphag pools %	Absent	Absent
Dominant pool Sphag		
Sphag lawns %	Absent	Absent
Sphag humm %	51-75	51-75
Sphag holl %	11-25	4-10
Total Sphag %	51-75	51-75
Hummocks indicators		S. austinii
Cladonia portent %	Absent	4-10
Other Cladonia sp	Cladonia floerkeana	C. uncialis
C. panicea %	Absent	Absent
Calluna cover %	11-25	26-33
Calluna height(cm)	11-20	11-20
Other NotableSpecies		E. tetralix high cover
Other comment		
Date	**09/03/2005**	**16/09/2011**

Appendix IV Survey maps

Raised Bog Monitoring Survey 2011

Map 1: Ecotopes Map and Quadrats

Ecologic Environmental & Ecological Consultants Ltd.

Sharavogue Bog SAC (000585)
Co. Offaly

1:9,000

N

0 115 230 460 690 920 Meters

Legend

Ecotope type

- Central
- Sub-central
- Bog Woodland
- Woodland
- Active Flush
- Open water
- Sub-marginal
- Inactive Flush
- Marginal
- Face bank
- Quadrat
- SAC

Raised Bog Monitoring Survey 2011

Map 2: Vegetation community complexes

Ecologic Environmental & Ecological Consultants Ltd.

Sharavogue Bog SAC (000585)
Co. Offaly

N

1:9,000

0 125 250 500 750 1,000 Meters

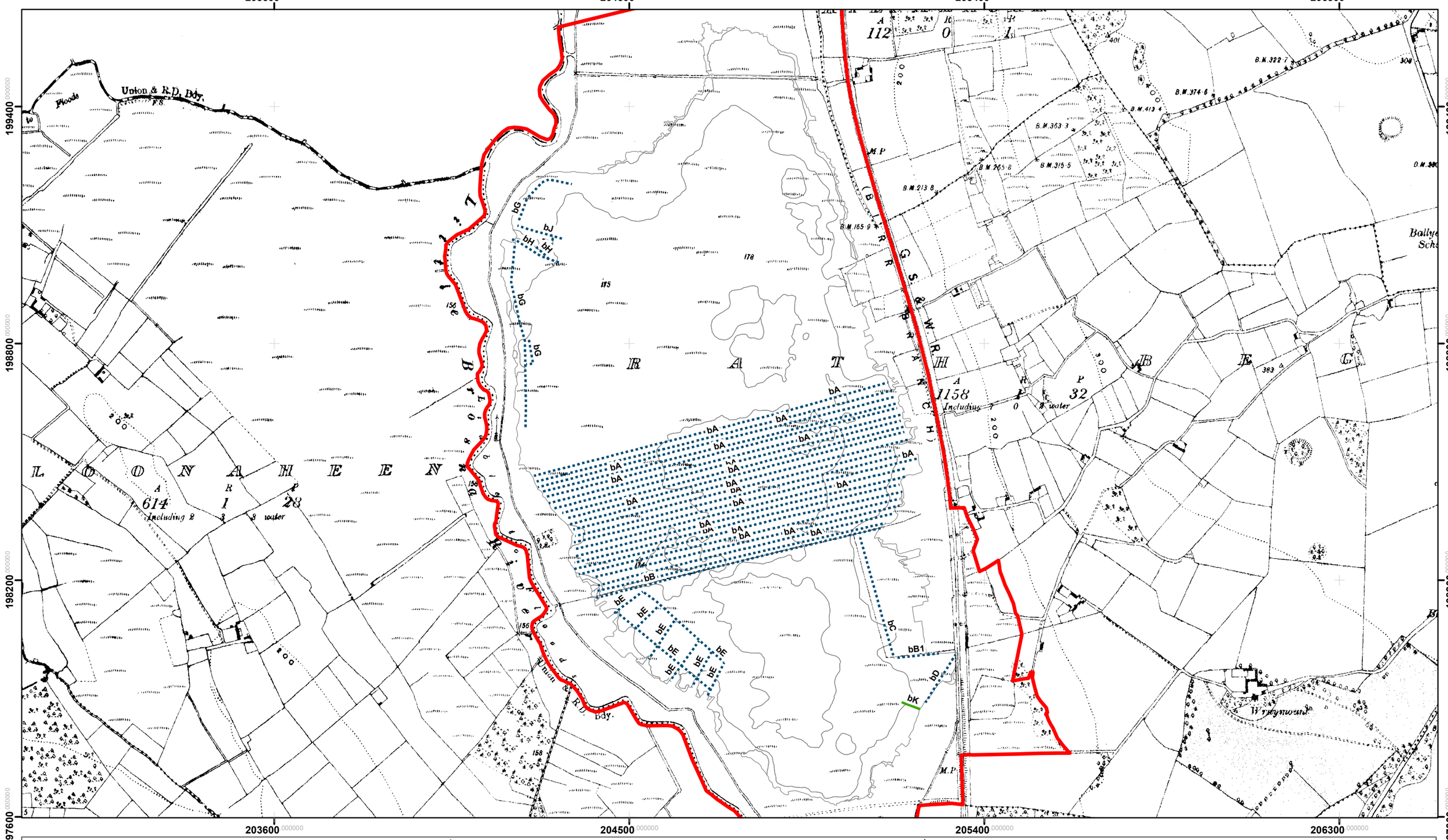
Legend

Ecotope type

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

Boundary type

- 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 Survey 2011

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

Ecologic Environmental & Ecological Consultants Ltd.

Sharavogue Bog SAC (000585)
Co. Offaly

N

1:9,000

0 125 250 500 750 1,000 Meters

Legend

High Bog drainage

- Blocked:non-functional
- Blocked:reduced functional
- Not blocked:functional
- Not blocked:non-functional
- Not blocked:reduced functional

- Ecotopes
- SAC