Trien Bog (SAC 002110), Co. Roscommon

Executive Summary

This survey, carried out in February 2013, aimed to assess the conservation status of habitats listed on Annex I of the European Habitats Directive (92/43EEC) on the high bog at Trien 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, Bog Woodland, Degraded Raised Bog and Depressions on peat substrates of the Rhynchosporion.

Active Raised Bog (ARB) covers 24.24 ha (19.5%) of the high bog area. Central ecotope is absent from the site, and high quality Active Raised Bog consists of sub-central ecotope on the southern lobe and in small areas on the northern lobe, as well as active flush vegetation. *Sphagnum* cover up to 50% and pools are present. The central part of the northern lobe is occupied by a large active flush. *Sphagnum* cover is mostly 11-25%, and in places less. Other species which are indicative of flushing are present. Within this flush is a small area of Bog Woodland and several other small wooded flushes. The flush is inactive in places and it forms a mosaic within the active flush, but it has been largely mapped as active flush X.

Degraded Raised Bog (DRB) covers 99.98ha (80.5%) 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 some inactive flushes on the perimeter of the southern lobe and a larger inactive flush X adjacent to the active flush X on the northern lobe. *Molinia caerulea* dominates the vegetation of the inactive flush X and *Sphagnum* cover is <10%. 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 associated with the edges of pools. *Rhynchospora alba* is noticeably absent from the active flush areas on Trien Bog.

Trien Bog features a very small birch dominated Bog Woodland covering 0.04ha. It barely meets the criteria for classification as priority Annex I habitat Bog Woodland (91DO) as its extent is rather

small and woodland canopy is only slightly higher than the required to be considered a woodland (>30%).

No restoration works have taken place at this site.

The current conservation objective for Trien Bog is to restore the area of Active Raised Bog and Bog Woodland 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 55.84ha (which includes the area of Bog Woodland). 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 to 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 (0.10ha) within **Sc7** at Trien Bog in the 2004 to 2013 period. This is associated with the effects of drainage. The distribution of the habitat has also changed considerably since 2004 due to more comprehensive surveying and more accurate mapping. The former central area **C1** has been re-named as **Sc7**. This downgrade in ecotope type is not a real loss of central ecotope, despite actual sub-central ecotope losses within **Sc7**. The vegetation has not changed significantly, but it is now considered to have been inappropriately named as central in 2004 and so was re-interpreted as sub-central. The sub-central area **Sc2** in 2004 on the southern lobe has now been merged into **Sc1** as the two areas were found to be linked by sub-central vegetation. Former sub-central areas **Sc3, Sc5** and **Sc6** have all been included as part of the active flush **X.** Two new peat forming areas (**Sc8** and **Sc9**) have been described at the site. These new sub-central ecotope areas are the result of a more comprehensive survey in 2012 rather than actual changes in Active Raised Bog.

The biggest change has been in the re-naming of much of the large inactive flush X in 2004 on the northern lobe of Trien Bog as active flush **X**. This is partly due to more comprehensive surveying which revealed that although the flush is a mosaic of active and inactive flush areas, it is on balance

more active than inactive, but also re-interpretation of vegetation. Also it has now recovered from a fire event of 2001/02.

The 2013 survey has also noted the spread of pine (*Pinus* sp.), in the drier sections of active flush **X**.

Drainage of the high bog and peat cutting are the most threatening current activities at the site. 0.12ha of high bog have been lost in the 2004-2010 period due to peat cutting. 2.3km of drains remain functional and 8.8km reduced functional. Drainage is considered to be the main reason for the decline in Active Raised Bog. No fire events have affected the bog in the reporting period, and the vegetation on the western side of the site, that was reported as burnt in the 2004 survey has recovered.

Active Raised Bog has been given an overall **Unfavourable Bad-Declining** conservation status assessment. Habitat Area has slightly decreased and quality remained stable in the reporting period. The current Area value is below favourable reference values. The S&Fs assessment is however above reference value, this is due to a re-naming of an area of inactive flush in 2004 as active flush in 2013 which has increased the area of ARB. This is a re-interpretation of the 2004 vegetation data rather than a real change due to an improvement in ARB. It should be highlighted that the active flush vegetation at the site is not the highest quality type more associated to soak systems in other raised bogs. Future Prospects are considered Unfavourable Bad-Declining as impacting activities (drainage and peat cutting) continue to threaten the habitat.

Bog Woodland has been given an **Unfavourable Inadequate-Declining** assessment.

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

The **overall raised bog** at **Trien 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, further hydrological and topographical studies to ascertain more accurate FRVs; further botanical monitoring surveys. Other recommendation include: an impact assessment of maintenance works on adjacent land drainage with a view to the potential of blocking these drains.

Site identification

SAC no.:	002110	**6" Sheet:**	RN26
Grid Ref.:	M650760	**1:50,000 Sheet:**	12
High Bog area (ha):	124.22 [1]		
Dates of Visit:	04,06/02/2013		
Townlands:	Foughil, Creggancor, Annagh and Cloonfelliv.		

[1] The current extent of the high bog is 124.22ha, while that reported in 2004 was 122.24ha (Fernandez *et al*., 2005). This discrepancy is the result of more accurate mapping of the high bog edge by using the higher resolution 2010 aerial images compared to those used in 2004, rather than any actual increase in high bog extent. High bog area has in fact decreased in the 2004-2012 period due to peat cutting. The actual high bog extent in 2004 was 124.36ha (see tables 8.1 and 8.3 2004 (amended) figures).

Site location

Trien Bog is located approximately 2km SSW of Castlerea, Co. Roscommon. A bog road runs through the centre of the site and access may be obtained from this. Trien is separated from Corliskea, which lies to the SE, by a minor road. Kelly *et al*. (1995) grouped Trien with the raised bogs of NE Galway/NW Roscommon. It lies immediately north of Cloonfelliv Bog (part of the same SAC), immediately north-west of Corliskea (part of the same SAC) and 1km to the north-east of Moorfield Bog/Farm Cottage Bog (NHA).

Description of the survey

The survey was carried out in February 2013 and involved a vegetation survey of the high bog at Trien Bog and the recording of impacting activities affecting high bog vegetation. A similar survey was carried out in 2004 by Fernandez *et al*. (2005). High bog vegetation was described and mapped, based on raised bog ecotope vegetation community complexes developed by Kelly and Schouten (2002). Detailed notes were taken on each community complex and any flushed areas that were present. These included: species lists; estimation of % cover of dominant species; percentage *Sphagnum* cover; evidence of damage (due to burning, peat cutting or drainage); micro-topography; ground firmness; and presence of *Cladonia* species. A list of photographical records is given in

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

The entire high bog of Trien Bog was re-surveyed. Sections mapped as sub-marginal, sub-central and central ecotope in 2004 were surveyed in more detail. These are the areas where changes were likely to have occurred. Quadrats, which describe the micro-topographical features and indicator species were recorded including a Bog Woodland quadrat (see Appendix III). The size of quadrats was 4m x 4m for Active Raised Bog and 10 x 10m for Bog Woodland.

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

This is a Ridge Basin Bog type that has been classified as an Intermediate Raised Bog indicating that it shares features with blanket bogs (Cross, 1990). It is divided into two lobes by a track and covers a large inter-drumlin area between the River Suck and the Island River. There are drumlins to the E and W of the SE lobe and to the NE of the main bog and is part of the same SAC as the adjacent Corliskea and Cloonfelliv Bogs.

Ecological Information

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

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

- Active Raised Bog (EU code 7110),
- Bog Woodland (EU code 91D0),

- 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 Trien Bog is 24.24ha (19.5%% of the high bog). Active Raised Bog includes sub-central ecotope, active flushes and Bog Woodland. Sub-central ecotope was found at five locations (**Sc1, Sc4, Sc7, Sc8** and **Sc9**) (see Appendix IV, Map 1).The numbering of the sub-central areas is not consecutive because some sub-central areas have been amalgamated since the last survey in 2004. Three sub-central community complex types were recorded, but **complex 6/9+ P** is the most widespread on the site. Complex 6/9+P consists of low hummocks, and hollows. Pools cover 11-25%. *Sphagnum* cover is up to 50%, but often less. *Narthecium ossifragum* is a constant but its cover is relatively low (4-10%). *Carex panicea* is occasional. The pools are filled with *S. cuspidatum* and less *S. denticulatum. Sphagnum papillosum* is often around the pool edges or in low hummocks. *Rhynchospora alba* is associated with the edges of pools or hollows. Other species occurring rarely are *Sphagnum fuscum* and *S. austinii. Racomitrium lanuginosum* and *Campylopus atrovirens* are also rare. Where *Narthecium* is absent, this becomes complex 9+P which was notable in the north-western part of **Sc1**. Complex 3/35 is found in **Sc7.** This is an area which was mapped as a central area in 2004. However, comparing the vegetation descriptions between 2004 and 2013, the area does not appear to have changed and thus its re-classification is considered to be due to interpretation differences rather than actual real changes to the quality of the vegetation. The ground is soft. The pools are often interconnecting and long, covering about 25%. *Sphagnum* cover is 30-40% and more or less in places. The main species include *Calluna vulgaris* (11-25%), *Eriophorum vaginatum* (4-10%), *Carex panicea* (4-10%; higher in places), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Rhynchospora alba* (<4%; higher in places), *Menyanthes trifoliata* (<4%), *Racomitrium lanuginosum* (<4%), *Cladonia uncialis* (<4%), *Sphagnum* species include; *S. capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. papillosum* (H & P; 4-10%; higher in places), *S. denticulatum* (P; <4%) and *S. cuspidatum* (P; 4-10%).

Complex 9/7/10 is another sub-central community complex occurring at a few locations in **Sc1** and north of active flush **X**. It is characterised by soft ground with a *Sphagnum* cover around 30% and with few or no pools. *Eriophorum vaginatum* and *Calluna vulgaris* are the main higher plants. *Cladonia* is extensive (11-25%) forming white cushions on the vegetation. *Narthecium* and *Carex panicea* are few or absent. The presence of species such as *Molina caerulea, Aulacomnium palustre* and *Vaccinium oxycoccos* are indicative of some flushing.

There are two active peat forming flushes (**X** and **Y**) on Trien Bog. Active flush **X** occupies the central part of the northern lobe. The ground is soft and there are almost no pools. The vegetation is characterised by a high cover of *Calluna* and *Cladonia*. Beneath this layer, the *Sphagnum* cover within this flush is 11-25% which is low considering it is classed as an active flush. However, the high cover of *Cladonia portentosa* may, at least partially, be the reason for the low *Sphagnum* cover as it dominates large areas of hummocks. *Sphagnum* spp. include small amounts of *S. palustre* and *S. fallax. Molinia caerulea* is present (4-10%) and is higher forming occasional tussocks. *Pleurozium schreberi* and *Hylocomium splendens* form hummocks often associated with *Molinia.* Other species indicative of flushing include *Vaccinium oxycoccos, Empetrum nigrum, Aulacomnium palustre* and *Polytrichum strictum.* Patches of inactive flush dominated by a higher cover of *Molinia caerulea* are present within the active flush, mainly on the western side of flush **X**. However, these areas form a mosaic with the active flush.

There are six wooded flushes **(X1-X6)** within the main flush **X**. These are characterised by the presence of birch (*Betula pubescens*) trees. Typically they are 2-6m high and mostly <10cms diameter at breast height (dbh), although there are a few up to 8m tall and >20cms dbh. Wooded flush **X1** is the largest of the wooded flush areas and is comprised of scattered small birch trees in a wet flush area around the bog woodland (**BW1**). The canopy is 2-4m high and a few trees up to 5m high, and diameter at breast height (dbh) <10cm's. The trees are too few and too small to be classified as woodland. Wooded flush **X3** is quite similar to wooded flush **X1**. It had been recorded as being burnt in the 2004 survey. Wooded flush **X3** has a few birch trees 6-8m high, but most are 1-2m high. There is a drain flowing through the middle of it, which goes underground. A pine tree (*Pinus sp)* 9m high has given rise to many saplings 1-2m high germinating around the flush after the burning event in 2001/02. It seems the birch is expanding. It almost links up with wooded flush **X4**.

Wooded flush **X4** located < 25m to the south-east of wooded flush **X3**. It has one birch tree (*Betula pubescens*) (7m high) and 25cm dbh, and a few trees around 5m high, but most are <2m high. Although *Sphagnum* cover is quite low and partly hidden under the cushions of *Hylocomium* and *Pleurozium,* the ground is wet under-foot.

Wooded flush **X2** is similar to wooded flush **X4**. The birch trees are mostly 1-3m high with a few >5m high and the canopy cover is <5%.

Wooded flush **X5** is located in the western part of the northern lobe. It had been recorded as being burnt in the 2004 survey. There is no canopy cover in wooded flush **X5**, except for a very small area in the very west where there a number (ca. ten) of 3.0-4.0m *Betula pubescens* trees. However, even here the canopy cover is <5%. Over most of the flush, the *Betula* is much smaller (mostly 1.0-2.0m). The hummocks of *Sphagnum palustre* appear to be largely confined to the bases of the taller *Betula*

trees. *Sphagnum fallax* and *S. cuspidatum* are localised and while the cover of *Vaccinium oxycoccos* is low, it is widespread.

Wooded flush **X6** is a newly mapped area just north of wooded flush **X3**. It is basically an active flush with scattered birch trees, mostly 1-2m and a few trees >5m high. It seems that birch is expanding in this area as it was not mapped in 2004.

Active flush **Y** is located in the central part of the south-eastern lobe of Trien Bog. It is a lot smaller than flush **X** but the vegetation is quite similar. The *Sphagnum* cover within this flush is variable with hummocks being quite firm in places and being largely dominated by *Cladonia portentosa*. However, the hollows are very soft and have a high *Sphagnum* cover with the moderate cover of *S. palustre* being particularly notable. A very small area of *S. fallax* was noted as well as 1.5 – 2.0m *Betula pubescens* trees.

Degraded Raised Bog (7120)

The current area of Degraded Raised Bog at Trien Bog is 99.98ha (80.5% 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 permanent pools are localised.

The sub-marginal ecotope features the most developed micro-topography within Degraded Raised Bog. There are two main sub-marginal community complexes at Trien; Community complex 9/7/3+P is found on the northern lobe of the site generally close to edge of the sub-central ecotope. Pools are present and mean *Sphagnum* cover is 11-25%. The *Sphagnum* cover in the pools is quite variable, ranging from a good cover (11-25%) of *S. cuspidatum* and *S. denticulatum* to absent with some algae. The vegetation is characterised by abundant *Calluna* and *Cladonia*. *Carex panicea* is a constant (4-10%), but *Narthecium* is generally low (<4%).

In places such as north of flush **X**, the pools are elongated and more or less oriented in a NW/SE direction and this is called complex 9/7/3+TP. Where pools are absent it becomes complex 9/7/3. A second sub-marginal community is complex 6/3+P. It is widespread throughout the site, especially on the eastern lobe. It has some similarities to 9/7/3+P, but with a higher cover of *Narthecium* (11-25%) and lower cover of *Calluna*. The pool *sphagnum* cover is generally poorer. Complex 6/3+P often grades into the sub-central complex 6/9+P. The complex 9/7 is found on the northern lobe near Sc7. Although it has no pools, the ground is soft and the main species in the vegetation are *Calluna vulgaris*, *Eriophorum vaginatum* and *Sphagnum* spp. *Cladonia* is common also, but there is a

notable absence or <4% cover of *Narthecium* and *Carex panicea*. A small area of the complex 4/9a is found south of **Sc1** on the eastern lobe. This is a wet area characterised by high incidence of *Rhynchospora alba* (11-25%) and *Eriophorum angustifolium* (11-25%). The shallow poorly defined 'pools' are mostly open water with little *Sphagnum* cover.

Marginal ecotope is slightly drier than sub-marginal ecotope and mainly occurs as a narrow to broad band near the margins of the high bog. The micro-topography consists of *Calluna vulgaris* hummocks, low *Sphagnum* hummocks, flats and very occasionally hollows and tear pools. The *Sphagnum* cover is even lower here than in the sub-marginal ecotope (<10%) and the vegetation is characterised by a higher cover of *Carex panicea, Narthecium ossifragum, Trichophorum germanicum,* and *Calluna vulgaris*. The most frequent marginal community is complex **3/6**. Where this complex occurs to the east of flush **X** in the northern lobe of the site, a series of swallow holes are found extending in a NNE/SSW direction. Tall robust *Calluna vulgaris*, *Rubus fruticosus*, *Blechnum spicant*, *Pteridium aquilinum* and *Molinia caerulea* are found in and around the swallow holes. On some steeply sloped margins on the west of the northern lobe, this complex becomes complex 3/6/4 with *Rhynchospora alba* (4-10%) becoming frequent in depressions and run-off channels. Where this complex occurs in the area burnt in 2001/02 (in the west of the northern lobe) *Campylopus introflexus* was frequent. In the north-east of the northern lobe, where *Calluna* predominates, with up to 50% cover, and *Carex panicea* is still high, this becomes complex 3/7.

Face bank ecotope is characterised by firm ground, tall *Calluna vulgaris*, poor *Sphagnum* cover and a flat micro-topography. This ecotope covers localised areas on the east and northern edge of the high bog. *Calluna* is the dominant species with very low *Sphagnum* cover (<4%).

The high bog also features an inactive flush **X** located on the western side of active flush **X**. This extends south-eastwards to form a long arm. The ground is firmer and drier and there is a predominance of *Molinia caerulea* which often forms dense tussocks. *Sphagnum* cover is low (4-10%). Although some of the other flush species listed above also occur here, they are in much lower abundance. Patches of inactive flush occur throughout the active flush **X** also but were too small to map.

Depressions on peat substrates of the Rhynchosporion (7150)

Rhynchosporion vegetation is widespread on Trien Bog. It is found in both Active and Degraded Raised Bog, but tends to be best developed and most stable in the wettest areas of Active Raised Bog. In these areas, the Rhynchosporion vegetation occurs within *Sphagnum* hollows and along *Sphagnum* pool edges and on lawns. It is found in all of the sub-central complexes 3/35, 9+P, 9/7/10, and 6/9+P at a low level of cover (<4%). In the sub-marginal ecotope, it was also found in

community complexes 9/7/3+P and 6/3+P at <4% cover. However it was in abundance within the small wet sub-marginal complex 4/9A where it reached 11-25% cover. Typical plant species within this ecotope included *Rhynchospora alba*, *Sphagnum cuspidatum, S. magellanicum, S. papillosum*, and *Eriophorum angustifolium*.

R. alba was also found within the marginal complex 3/6+P in Degraded Raised Bog, but always associated with wet features such as hollows and run off channels.

Bog Woodland

Bog Woodland is found at one location on the high bog at Trien (**BW1**) and it covers a very small area (0.04 ha). There are other areas of birch trees in the flushed parts of the site, but the size of the trees and canopy cover are insufficient to qualify as bog woodland. They are described as wooded flushes (**X1-X6**), and are described under active flush ecotope.

The small Bog Woodland occurs in the northern lobe of the site. The median height of the trees is 5m with some up to 8m and some <4m. There are no other tree species present. Beneath the tree canopy which is just up to 30% cover, the moss cover is 75-80%, but only 10-15% of this is *Sphagnum* spp., which include *S. capillifolium*, and *S. palustre.* The latter species is associated with wet flushes. The most abundant other mosses, which form hummocks, are *Pleurozium schreberi* and *Hylocomium splendens*. Low shrubs include *Calluna* (10% cover) and *Vaccinium myrtillus* (<4%). *Molinia caerulea* is also present. A number of other species are present which are good indicators of flushing, they include; *Aulacomnium palustre, Vaccinium oxycoccos* and *Polytrichum strictum.*

Detailed vegetation description of the high bog

A detailed description of high bog vegetation recorded during the 2013 survey of Trien 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 Trien 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	0.12haof the high bog cut away	Inside High Bog: 5 different locations around northern lobe high bog section	**7120**
C01.03	Peat extraction	L	-1	0.12haof the high bog cut away	Inside High Bog: 5 different locations around northern lobe high bog section	**7110/7150/91D0**
J02.07	Drainage	H	-1	11.03km [1]	Inside High Bog	**7110**
J02.07	Drainage	M	-1	11.03km [1]	Inside High Bog	**7120/7150/91D0**
J02.07	Drainage	M	-1	n/av	Outside High Bog in cutover and adjacent agricultural drainage	**7110/7120/7150/91D0**
I01	Invasive alien species	L	-1	<0.01ha [3]	*Pinus* sp. and Rhododendron Inside High Bog	**7110/7120/7150**
B02.01	Artificial planting on open ground (non-native trees)	L	-1	4ha	Outside 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.

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

n/av: not available

Peat cutting

This activity has taken place at 5 locations on the site during the reporting period 2004-2010. As follows: 3 locations (plots) along the east and south (1 location) of the largest western high bog section, as well as one location on the cutover immediately adjacent to the north of the smaller eastern high bog section (E165871/N275428) in the 2004-2010 period. This has reduced the area of high bog by 0.12ha in this period. The loss of high bog from peat cutting 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 2010-2013 period. Further high bog may therefore have been lost and the figure quoted should be considered a minimum value. Fernandez *et al*. (2005) considered that there were 5 active turf plots in 2004. It appears no significant change in turf cutting since 2004; however McGowan *et al.* (2004) had recorded 10 active turf plots in 1994, so this represents an overall reduction in the number of active turf plots since then.

This activity is considered to have a high importance/impact on Degraded Raised Bog habitat, low importance/impact on Active Raised Bog, Rhynchosporion depressions and Bog Woodland. The continuation of these peat cutting will prevent the recovery of the high bog, and the recovery of ARB towards FRVs as restoration works cannot be employed until such activities stop. It should also be borne in mind that peat cutting has already had a serious negative impact over a long period at this site, indicated by the fact that ARB covers only a very small area (24.24ha or 19.5% of the high bog) and is 56.59% below the FRV target. In addition, old face banks and high bog and cutover drainage associated with cutting continue to cause negative impacts on the high bog habitats.

Drainage

High bog drainage

This bog has been extensively drained in connection with peat cutting according to Fernandez *et al.* (2005). In the south, a line of six drains (drain bF1-bF6) runs the entire length of the bog. The remaining high bog drains are relatively scattered and short. Table 6.2 shows no change on the status of high bog drains. The majority of drains in the high bog remain reduced functional (8.765km), or functional (2.265km) or non-functional (0.238km). Reduced functional drains are also 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 a high

importance/impact on Active Raised Bog habitat, medium importance/impact on Degraded Raised Bog and Rhynchosporion depressions and Bog Woodland.

No blockage of drains has occurred to date.

Table 6.2 High bog drainage summary

Status	2004 (km) [1]	2013 (km)	Change
NB: functional	2.265	2.265	0.000
NB: reduced functional	8.765	8.765	0.000
NB: non- functional	0.238	0.238	0.000
B: functional	0.000	0.000	0.000
B: reduced functional	0.000	0.000	0.000
B: non- functional	0.000	0.000	0.000

B: Blocked; NB: Not blocked

[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 Trien Bog. There was no change in their functionality in the 2004 – 2013 reporting period (see Map 3).

Table 6.3 High bog drainage detail

Drain Name	Length (km)	2004 status	2013 status	Change	Comment
bA	0.378	NB: functional	NB: functional	No	Triple drain
bE	0.328	NB: functional	NB: functional	No	
bF1-6	6.333	NB: reduced functional	NB: reduced functional	No	
bG	0.037	NB: non-functional	NB: non- functional	No	
bJ	0.104	NB: functional	NB: functional	No	Northern section of drain was wrongly classified as non-functional in 2004
bJ	0.134	NB: reduced functional	NB: reduced functional	No	Middle section of drain
bJ	0.115	NB: non-functional	NB: non- functional	No	Southern section of drain
bJ1	0.104	NB: functional	NB: functional	No	
bK	0.201	NB: reduced functional	NB: reduced functional	No	
bL1	0.319	NB: functional	NB: functional	No	Southern section of drain
bL1	0.130	NB: reduced functional	NB: reduced functional	No	Northern section of drain
bL2	0.323	NB: functional	NB: functional	No	Southern section of drain

bL2	0.131	NB: reduced functional	NB: reduced functional	No	Northern section of drain
bM	0.086	NB: non-functional	NB: non- functional	No	
bN	0.742	NB: reduced functional	NB: reduced functional	No	Drain running though flush X
bP	0.018	NB: functional	NB: functional	No	Drain already present in 2004 but not mapped
bQ	0.085	NB: functional	NB: functional	No	This drain was wrongly classified as reduced-functional in 2004
bR	0.094	NB: functional	NB: functional	No	Drain already present in 2004 but not mapped
bS	0.026	NB: functional	NB: functional	No	””
b2A	0.314	NB: reduced functional	NB: reduced functional	No	Double drain
b2D	0.238	NB: reduced functional	NB: reduced functional	No	
b3D	0.074	NB: reduced functional	NB: reduced functional	No	
b2E	0.050	NB: functional	NB: functional	No	This drain was wrongly classified as reduced functional in 2004
b2F	0.041	NB: functional	NB: functional	No	””
b2G	0.067	NB: functional	NB: functional	No	””
b3G	0.038	NB: functional	NB: functional	No	Drain already present in 2004 but not mapped
b2H	0.078	NB: functional	NB: functional	No	
b2J	0.156	NB: functional	NB: functional	No	This drain was wrongly classified as reduced functional in 2004
b2K	0.069	NB: reduced functional	NB: reduced functional	No	
b2N	0.060	NB: reduced functional	NB: reduced functional	No	
b2O	0.056	NB: functional	NB: functional	No	
b2R	0.339	NB: reduced functional	NB: reduced functional	No	

Bog margin drainage

The cutover areas were not surveyed for drains during 2013.

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

Drainage maintenance associated with agricultural improvements is evident on the 2010 aerial photograph: within the SAC to the north of the high bog, (E 165361/ N 276423) (0.2km approx.).

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

Fire history

Close to 50% (35.19ha) of the NW lobe were burned in ca. 2001-02 affecting the south and west of the lobe including parts of the flush. Kelly *at al*. (1995) also noted recent burning in 1994, in parts of the south and west of the SE lobe. Douglas and Grogan (1985) also noted that the area of pools, north of the flush on the NW lobe has been burned 6-7 years previous to their visit.

No fire events have been reported on the high bog in the 2004-2013 reporting period. There is no evidence of recent burning. The two areas of wooded flush (X2 and X3) which had been burned in 2001-02 have partially recovered.

Invasive species

A number of pine trees (*Pinus sp.*), some which were reported in the 2005 by Fernandez *et al*. (2005) have produced seed which has germinated. For example at wooded flush **X3** there is a pine tree with 30+ saplings up to 1.5m high. So *Pinus* sp. appears to be spreading, although at a low rate. Two small Rhododendron (*Rhododendron ponticum*) bushes < 1.5m high were recorded on the site. One had been noted in the 2004 survey.

Invasive species are considered to have low importance/impact on Active Raised Bog habitat, Degraded Raised Bog and Rhynchosporion depressions and no impact on Bog Woodland.

Afforestation and forestry management

Apart from a single line of *Pinus sylvestris* extending approximately 150m in an ESE/WNW direction in the north of the NW lobe of Trien Bog (E 165345 / N 276325); there are no plantations on the high bog. There are now localised areas of *Pinus sp*. saplings in former burnt areas of bog and which have germinated since the fire in 2001-02.

There is an area of forestry (4ha) on adjacent cutover to the southwest (E 165000 / N 274911), but separated from Trien high bog by a road.

On Corliskea bog to the south-east, which is part of the same SAC, there is a Lodgepole pine (*Pinus contorta*) plantation on the high bog to the north-west and another Lodgepole pine plantation with some Sitka spruce (*Picea sitchensis*) on cutover to the south-west of the site. It is likely that *Pinus* spp. will continue to spread on the high bog of Trien Bog, but at a low rate.

Afforestation is considered to have a low importance/impact on Active Raised Bog habitat, Degraded Raised Bog and Rhynchosporion depressions and no impact on Bog Woodland.

Other impacting activities

No other significant impacting activities were noted or recorded in 2013 impacting high bog habitats in the 2004-2013 reporting period.

Conservation activities

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

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 small decrease (-0.10ha) in the area of Active Raised Bog within **Sc7** (former **C1**) due to drying out processes caused by drainage. In addition, the distribution of the habitat has changed considerably, however this is due to more comprehensive surveying which enabled more accurate mapping compared to the 2004 survey. The area of central (**C1**) ecotope that was recorded in 2004, in the north-west of the site has been re-classified as sub-central ecotope (**Sc7)**. The vegetation of the habitat has apparently remained relatively stable. In 1995 it was labelled as complex 6/3/35, which would be classed as sub-central under the 2005 & 2012 classification system. In 2004 it was called complex 35 but the surface was described as being 'firm in places' and the *Sphagnum* cover estimated at 50%. The *Sphagnum* cover in 2013 was estimated at 34-50%. Hence a sub-central classification is more accurate. Nevertheless the extent of **Sc7** (former **C1**) has decreased, with several central ecotope dots recorded in 2004 now mapped as sub-marginal ecotope and therefore outside **Sc7**. Therefore, indicating an actual loss of Active Raised Bog habitat in this section of the high bog.

The sub-central areas **Sc1** and **Sc2** on the eastern lobe have been merged. It was found that there was enough sub-central vegetation in the narrow gap between **Sc1** and **Sc2** to link them together into one larger area which is all called **Sc1.** This is the result of more comprehensive surveying rather than any other real change.

Sc3 is located inside flush **X.** It was found to be smaller than mapped in 2004, with a number of sub-marginal points. The wetter areas are quite flushed. It was decided to leave this as part of the active flush **X**.

Sc5 and **Sc6**, which were located adjacent to the southern edge of the active flush **X**, were also found to be contiguous with the active flush **X**. The vegetation includes a number of similar flush species, so they too have been incorporated into the main body of flush **X**. Hence **Sc3** and **Sc5** no longer exist as separate areas of sub-central ecotope.

Sc4 is located at the north-eastern side of the site. It has increased in area since 2004. Again this is due to interpretation following more comprehensive surveying. It is a mosaic of sub-central and sub-marginal habitat with pools. Further north-west this grades into predominantly more sub-marginal ecotope but interspersed with sub-central patches, which were too small to map. This demonstrates the mosaic nature of the habitat and difficulty in determining boundaries around it.

Sc7 as described above is due to a re-classifying of a former central area **C1**. This is due to interpretation rather than any real change.

Sc8 and **Sc9** are two newly mapped areas of sub-central near the north-western boundary of the site. They are in an area which was poorly mapped in 2004 and were likely to have been overlooked.

There have also been changes in the distribution of the active flush ecotope on the site.

Active flush **X** located on the northern lobe has been extended to include much of what was previously classified as inactive flush **X**. Although this area is a mosaic of active and inactive flush, and the *Sphagnum* cover in places is low (<11%), on balance it is considered to be more active than inactive, hence the change. In 2004 the western part of flush X was also recovering from being burnt, this may have given a drier appearance to the vegetation. This change of classification of the flush from inactive to active is due to interpretation rather than a real change.

Within the active flush **X**, there is a small area of Bog Woodland (**BW1**). It is smaller than reported in 2004. This is because the criterion for defining Bog Woodland (≥30% canopy) was overlooked in previous surveys. Hence this is not a real change in the extent of Bog Woodland. Thus some of the areas previously mapped as Bog Woodland are now mapped as described as wooded active peat-forming flushes.

There are six other areas of birch scrub within the active flush **X**. These are described as wooded flushes (**X1-X6**). Wooded flush **X1** is the largest and is the area around the Bog Woodland with an open canopy of birch trees <10% cover. Wooded flushes **X2** and **X4** have not changed significantly. **X3** and **X5** were burnt in 2004 and have partially recovered in the meantime. **X6** is a newly mapped area of wooded flush, which suggests that birch appears to be spreading on this site. There were localised areas of *Pinus sp*. saplings which have germinated in an area which was burnt in 2004.

To summarise there has been a real decrease in the area of ARB by (-0.10ha). Any other changes on the distribution or extent of the habitat is due to more comprehensive surveying which enabled more accurate mapping and re-interpretation of the habitat classification compared to the 2004

survey. Some of that change is also likely to be due to the recovery of vegetation on the western side of the high bog, including active flush **X** from the 2001/2 fire event.

The favourable reference value (FRV) for Area is considered to be the sum of Active Raised Bog (central, sub-central ecotopes, active flush and Bog Woodland) plus sub-marginal ecotope when the Habitats Directive came into force in 1994 (see table 8.4). Therefore, Active Raised Bog Area FRV is 55.84ha (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 (24.24ha) is 56.59% below the FRV. A current Area value of 0-5% below FRV falls into the **Unfavourable Bad** assessment category. Although a long term (1994-2013) trend indicates an increase in the area of Active Raised Bog at the site (13.08ha) (see table 8.1), this may be misleading, because it is due to a re-interpretation of the ecotope from inactive flush to active flush within flush **X**. Flush **X** is a mosaic of active and inactive flush and what was classified as inactive flush in 2004 which was re-interpretated as predominantly active flush in 2013. This was based on more extensive survey and more accurate mapping rather than a real improvement of ARB. On the other hand a short trend (2004-2013) assessment shows a **Decreasing** trend.

The Area of Active Raised Bog at Trien 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 12.10ha (half of 24.20ha, the current area of Active Raised Bog (excluding Bog Woodland). The current value is 15.36ha which is 26.94% above the FRV. Therefore S&Fs are given a **Favourable** assessment. The area of active flush appears to have increased significantly since the 2004 survey. However, this was due largely to a re-interpretation of inactive flush as active flush (flush **X**). The mosaic of active and inactive flush within X was re-interpreted as predominantly active flush. Part of this flush area has recovered from a burn in 2001-2. So the apparent increase may be misleading and thus it does not represent a real change in habitat quality. Therefore the S&Fs are given a **Stable** trend.

Quadrats analysis:

There were no quadrats recorded in the 2004 survey. Three quadrats were recorded in 2013 (**Qsc1**, **Qsc2** and **Qbw1**).

Qsc1: is located in the south-eastern lobe in a wet sub-central area where the ground was very soft. The community complex is 9+P. It has interconnecting pools with 11-25% cover and the overall *Sphagnum* cover was 34-50%. *Eriophorum vaginatum* was frequent with a cover of 20%. *E. angustifolium* was 5%. Although *Narthecium ossifragum* was almost absent as was *Carex panicea,* most of the surrounding sub-central community complex had a significant cover of these species and hence it became complex 6/9+P.

Qsc2 was located in the northern lobe in an area that was classified as central ecotope in 2004. In comparing the vegetation recorded in the 2013 with that of the 2004 and 1994 surveys, the vegetation has not changed significantly. The species present, their % cover, the micro-topography and overall ground wetness are more typical of sub-central habitat, so it has been re-named sub-central complex 3/35. The quadrat was located near the edge of the bog on a gentle slope where there were many interconnecting pools (11-25%). Total *Sphagnum* cover was 34-50% and sometimes less. The main pool *Sphagnum* was *S. cuspidatum* with *S. denticulatum*. The interpool areas varied from very soft to firm near the edge of the complex. *Carex panicea* was 4-10% and *Eriophorum* spp. were low <4%.

Qbw1 was the Bog Woodland quadrat. This was a very small area (0.0360ha.) of birch woodland in the centre of active flush **X** on the northern lobe. The woodland is comprised of a canopy of barely 30% cover of spindly birch (*Betula pubescens*) trees mostly <10cm's dbh. It was borderline as to whether it really met the criteria for inclusion as Bog Woodland. It contained a good diversity of Bog Woodland species, but it failed the conservation assessment at *Sphagnum* cover level (only 10-15%). The minimum requirement is 25% and also due to poor regeneration (<1 sapling/m^2 over 1m high) and low incidence of dead or senescing trees >10cm dbh. This patch of Bog Woodland was surrounded by a more extensive area of wooded flush **X1** and there were five other wooded flushes on the site (**X2-X6**), all more or less similar in terms of tree size and height. The active flush has a mean *Sphagnum* cover (11-25% and in places higher or lower). Other flush species include *Sphagnum palustre* and *S. fallax.*

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 Trien Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

Habitat Area has slightly decreased and S&Fs remained stable in the 2004-2013 reporting period. Habitats losses are associated with impacting activities on the high bog (drainage and peat cutting) and adjacent cutover (drainage). If these impacts continue, they are likely to have further losses of Active Raised Bog habitat in the future. The 2013 survey noted the increase of *Pinus* spp. saplings in localized areas on former burnt areas. Most plants are less than 2m high and are likely to have germinated after the severe fire event that took place in 2001/2. The spread of pines is likely to be an indication of further drying out of the high bog.

Habitat **Area** is currently 56.59% below FRV (see table 8.4) and a Decreasing trend is foreseen due to the overriding influence of negatively impacting activities. The habitat Area is expected to be more than 15% below FRV in the following two reporting periods (12 years). Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-Decreasing**. Habitat's **S&Fs** are currently 26.94% above FRV (see table 8.4) and although a Declining trend is also foreseen, the S&Fs are expected to be above FRV in the following two reporting periods. Thus, **S&Fs Future Prospects** are assessed as **Favourable-Declining**. **The overall habitat's Future Prospects are Unfavourable Bad-Declining** (see table 8.5). Blocking of remaining functional and reduced-functional drains both on the high bog and cutover and cessation of peat cutting is necessary. Although there is no evidence of a fire event since 2004; it is important to minimise the frequency and intensity of fire events to reduce the impact on high bog habitats.

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

Table 8.1 Changes in Active Raised Bog area

Active Ecotopes	1994[1]	2004	2004 (amended)	2013	Change (2004-2013)	
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	%
Central	2.33	0.39	0.00	0.00	0.00	0.00
Sub-central	7.96	7.24	8.94	8.84	(-)0.10	(-)1.12
Active flush	6.99	6.50	15.36	15.36	0.00	0.00
Bog Woodland[2]	0.04	0.04	0.04	0.04	0.00	0.00
Total	**17.32**	**14.17**	**24.34**	**24.24**	**(-)0.10**	**(-)0.41**

[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]Bog Woodland area has been amended to include only that part of the larger woodland/scrub area where canopy cover is a minimum of 30%. The larger area estimated in 1994 and 2005 has been amended to equal the current area, on the assumption that the earlier surveys incorporated a significant amount of the adjacent more open birch scrub into the woodland area.

Note: Table 8.1 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2013. The comparison between 2004 (amended) and 2013 illustrates the actual changes in ecotope area in the 2004-2013 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2013 (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	No longer present	**Sc7** was the former **C1**. This change is the result of re-interpretation of vegetation (i.e. the vegetation corresponds to sub-central ecotope instead of central). See Sc7 below.	
Sc1	Qsc1	Stable	Sc1 and former Sc2 are now part of the same sub-central ecotope area, all called Sc1. This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping.	Qsc1 – newly recorded.
Sc2	None	No longer present	””	
Sc3	None	No longer present	Sc3 is now considered to be part of active flush X1. This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping, as well as re-interpretation of vegetation.	
Sc4	None	Stable	Changes in boundary (larger). This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping and re-interpretation of vegetation.	
Sc5	None	No longer present	Sc5 is now considered to be part of active flush X1. This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping, as well as re-interpretation of vegetation.	
Sc6	None	No longer present	Sc6 is now considered to be part of active flush X1. This change is the result of more comprehensive	

			surveying in 2013 which resulted in more accurate mapping, as well as re-interpretation of vegetation.	
Sc7	Qsc2	Decreasing	**Sc7** was the former **C1**. Actual losses of sub-central ecotope have taken place within Sc7, indicated by the presence of former (2004) central ecotope dots within the area currently mapped as sub-marginal ecotope. This is considered to be associated with drying out processes caused by drainage.	Qsc2 – newly recorded.
Sc8	Qc1	Unknown	This specific area was not comprehensively surveyed in 2004/5. This is likely to be the result of more comprehensive surveying in 2013 which resulted in more accurate mapping.	
Sc9	None	Unknown	””	
Bw1	Qbw1	Stable	Changes in boundary (smaller). Only one section of active wooded flush now considered to have sufficient canopy (≥30%) to be deemed Bog Woodland.	Qbw1 – newly recorded.
F1	None	Stable	Slight changes in boundary (larger). This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping.	
F2	None	Stable	Changes in boundary (smaller). This change is the result of more comprehensive surveying in 2013 which resulted in more accurate mapping.	
U	None	Stable	””	
X1	None	Stable	This area was previously mapped as Bog Woodland. Now is considered to correspond with a wooded active flush. The canopy of this wooded active flush is >30% cover and is not sufficient to be deemed Bog Woodland.	
X2	None	Stable	””	
X3	None	Stable	This area was previously mapped as Bog Woodland (burnt). Now is considered to correspond with a wooded active flush. This wooded active is deemed not to have sufficient canopy (>30%) to be deemed Bog Woodland.	
X4	None	Stable	This area was previously mapped as Bog Woodland. Now is considered to correspond with a	

			wooded active flush. This wooded active is deemed not to have sufficient canopy (>30%) to be deemed Bog Woodland.	
X5	None	Stable	This area was previously mapped as Bog Woodland (burnt). Now is considered to correspond with a wooded active flush. This wooded active is deemed not to have sufficient canopy (>30%) to be deemed Bog Woodland	
X6	None	Stable	This area was previously mapped as active flush. However, this area was not comprehensively surveyed and now is deemed to correspond with a wooded active flush. This is the result of more comprehensive surveying rather than an actual change.	

Degraded Raised Bog (7120)

Area

The Degraded Raised Bog FRV for Area is 68.38ha at Trien Bog. This value corresponds with the difference between the current high bog area (124.22ha) and the Active Raised Bog FRV (55.84ha) 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 46.21% bigger than FRV and therefore the habitat Area is given an **Unfavourable Bad** assessment (see table 8.4).

Table 8.3, shows a slight increase (0.10ha) in the area of sub-marginal ecotope from 2004-2013. This is due to the loss of sub-central ecotope. High bog and particularly marginal ecotope has decreased by (-) 0.12ha due to peat cutting. Although the net area decrease is only 0.02ha, 1.2ha have been lost to peat cutting. As a result the habitat is given a **Decreasing** trend.

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

Structure & Functions

The FRV for S&Fs is for a maximum 25% of the Degraded Raised Bog area to be made up of marginal and face bank, i.e. the lower quality and drier vegetation communities. This value is 25ha

(25% of 99.98ha, the current area of Degraded Raised Bog). The current marginal and face bank ecotopes area value (55.87ha) is 123.52% above the FRV (in the particular case of Degraded Raised Bog a current area value equal or smaller than FRV is desirable) (see Table 8.4). A current value more than 25% above FRV falls into the **Unfavourable Bad** assessment category.

S&Fs trend is assessed based on actual changes within marginal and face banks ecotope (e.g. decreases due to rewetting processes or increases as a result of further drying out). Table 8.3 does not show any change in the area of face bank, however marginal ecotope has overall decreased by 0.12ha. This decrease is due to peat cutting and actual marginal or face bank increases associated with drying out processes have not been recorded. Thus, the DRB's S&Fs at Corliskea are given a **Stable** trend.

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

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

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

Future Prospects

Degraded Raised Bog has decreased slightly as result of peat cutting and this activity continues at the site thus further habitat losses will take place. Furthermore, drainage on the high bog continues damaging 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 2013 survey noted the spread of *Pinus sylvestris* in formerly burnt areas of high bog and particularly within the drier sections of the active wooded flushes (mainly X3). Many plants are less than 2m high and likely to have germinated after the severe fire event that took places in 2001/2. The spread of pines is likely to an indication of further high bog drying out.

Habitat **Area** is currently 46.21% above FRV (see table 8.4) and a Decreasing trend is expected in the following two reporting periods (12 years). As a result habitat Area is expected to remain more than 15% above FRV. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Bad-**

Decreasing. Habitat's **S&Fs** are currently 123.52% above FRV (see table 8.4). A Declining trend is foreseen in the following two reporting periods due to the ongoing negative effect of impacting activities and lack or restoration works, **S&Fs** are expected to remain more than 25% above FRV. Thus, habitat's **S&Fs Future Prospects** are assessed as **Unfavourable Bad-Declining**.

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

Table 8.3 Changes in Degraded Raised Bog area

Inactive Ecotopes	**1994[1]**	**2004**	**2004 (amended)**	**2013**	**Change (2004-2013)**	
	Area (ha)	**Area (ha)**	**Area (ha)**	**Area (ha)**	**Area (ha)**	**%**
Sub-marginal	38.52	33.38	40.43	40.53	(+)0.1	(+)0.25
Marginal[2]	57.25	61.29	55.09	54.95	(-)0.12	(-)0.25
Face bank[2]	n/a	0.56	0.92	0.92	0.00	0.00
Inactive flush	9.16	12.85	3.58	3.58	0.00	0.00
Total	**104.93**	**108.08**	**100.02**	**99.98**	**(-)0.02**	**(-)0.04**

[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 2013 marginal and face bank ecotope value given within the report should be taken as a maximum value. Their extent is based in the 2013 habitat survey and 2010 aerial photographs. It cannot be ruled out that further marginal and/or face bank ecotope losses may have taken place at the margin of the high bog in the 2011-2012 period associated with peat cutting.

Note: Table 8.3 includes 2004 figures and 2004 amended figures. The latter shows the ecotope area believed to be present in 2004 after surveying improvements in 2012. The comparison between 2004 (amended) and 2013 illustrates the actual changes in ecotope area in the 2004-2013 period. Any change in ecotope area between the 2004 and the 2004 (amended) values is due to improvement in mapping accuracy and/or the result of a more comprehensive survey in 2013.

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

Depressions on peat substrates of the Rhynchosporion (7150)

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

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

The Area trend assessment is based on the variation on Active Raised Bog and sub-marginal ecotope within Degraded Raised Bog in the reporting period. The area of Active Raised Bog has slightly decreased (0.10ha) in the reporting period. There has been a corresponding slight increase in sub-marginal 0.10ha. Therefore, the Area and S&Fs of depressions on peat substrates of the Rhynchosporion is likely to be Stable. As result habitat Area is given a **Stable** trend.

The habitat's Area Future Prospects status is equally based on the Active Raised Bog Area Future Prospects status assessment and the Area Future Prospects trend is based on the trend expected for Active Raised Bog and sub-marginal ecotope in the following two reporting periods. Impacting activities such as peat cutting and drainage are threatening Active and Degraded Raised Bog. Logically this has to have a long term negative effect on Rhynchosporion depressions. Therefore the habitat's Area Future Prospects are given an **Unfavourable Bad**-**Decreasing** assessment.

The S&Fs conservation assessment is also indirectly based on the Active Raised Bog S&Fs status and trend assessments, as Active Raised Bog supports the finest habitat quality type. Therefore, the habitat's S&Fs are given a **Favourable**-**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 a **Favourable**-**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 Trien Bog is assessed as Unfavourable Bad-Declining (see table 8.5).

Bog Woodland (91D0)

Area

The favourable reference value (FRV) for Area is 0.04ha at Trien Bog. The FRV corresponds with the area of this habitat present when the Habitats Directive came into force in 1994 (see table 8.4). Although Kelly *et al*. (1995) reported 2.15ha of Bog Woodland habitat in 1994, the more recent

survey 2013 survey has shown that only 0.04ha correspond with Bog Woodland based on the canopy criteria(≥30%). Another five birch wooded areas has been now classified as active wooded flushes (**X1-X6**) rather than Bog Woodland. This, change is the result of re-interpretation of vegetation rather than an actual change. In fact, habitat extent is considered to have not changed since 1994, and thus 0.04ha are deemed as the FRV for habitat Area.

A current habitat Area value greater or 0-5% below FRV falls into the **Favourable** assessment category. As the area of Bog Woodland has not changed in the reporting period (see table 8.1) the habitat Area is given a **Stable** trend assessment.

The Area of Bog Woodland at Trien Bog is assessed as Favourable-Stable (see table 8.5).

Structure & Functions

The FRV for S&Fs is assessed based on the assessment of monitoring stops (quadrats) recorded in 2013 (see Appendix III). A single monitoring stop was carried out, as the very small size of the habitat (0.04ha) dictated that it was not possible to record more than one. Although the monitoring stop passed on the combined positive, negative indicator species and structural data assessment, it failed on *Sphagnum* cover (10-15%) as it is below the minimum threshold of ≥25%. In addition the overall total canopy cover barely reached the target (30%) and therefore, is not a good example of the Annex I habitat Bog Woodland 91D0. The stop failed in the target tree species dbh, because all the trees are thin at <20cms dbh. It also failed on the dead tree/dead wood criteria because there are no old/senescing or dead stems or fallen trees >10cms dbh. Finally it failed on the regeneration criteria, because there are no birch saplings ≥1m high in the plot.

This would ordinarily indicate an Unfavourable S&Fs assessment. However, the Bog Woodland appeared in many respects to be in good condition, for its size and type, with wet ground, a high ground cover of bryophytes (75-80%), and a species composition and structure that satisfy the assessment criteria. In view of this, the habitat's S&Fs are given a **Favourable-Stable** assessment.

The habitat is considered to have not changed in the reporting period and thus is given a **Stable** trend.

The Structure & Functions of Bog Woodland at Trien Bog are assessed as Favourable-Stable (see table 8.5).

Future Prospects

Impacting activities such as peat cutting and drainage afforestation are threatening Active and Degraded Raised Bog at the site. The Bog Woodland is located to the north of the site and its location may be isolating the woodland from the drying out processes that are more severely affecting other high bog habitats. However, with continued impacts from drainage and peat cutting, there is likely to be future drying out of the Bog Woodland. In addition, the expansion of birch at wooded flush **X** suggests potential change and that the bog may be drying out.

Habitat **Area** is currently equal to the FRV (see table 8.4) and a Decreasing trend is foreseen in the following two reporting periods (12 years). The habitat Area is expected to be 5% - 15% below FRV below FRV in the following two reporting periods. Thus, habitat's **Area Future Prospects** are assessed as **Unfavourable Inadequate-Decreasing**. Habitat's **S&Fs** are also considered to be threatened as drying out processes continue. Thus, although FRVs have not been set for the habitat's S&Fs, this attribute's Future Prospects are assessed as **Unfavourable Inadequate-Declining**.

The overall conservation status of Bog Woodland at Trien Bog is assessed as Unfavourable Inadequate-Declining (see table 8.5).

Table 8.4 Habitats favourable reference values

Habitat	Area Assessment			Structure & Functions Assessment		
	FRV Target (ha) [1]	2013 value (ha) [2]	% below target	FRV 2013 Target (ha) [3]	2013 value (ha) [4]	% above target
7110	55.84	24.24	56.59	12.10	15.36	26.94

[1] 1994 central, sub-central, active flush, bog woodland and sub-marginal ecotope area.

[2] 2013 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] 2013 central ecotope and active flush area.

	FRV Target (ha) [5]	2013 value (ha) [6]	% above target	FRV 2013 Target (ha) [7]	2013 value (ha) [8]	% above target
7120	68.38	99.98	46.21	25.00	55.87	123.52

[5] Current high bog area minus 7110 area FRV.

[6] 2013 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.

	FRV Target (ha)	2013 value (ha)	% below target	FRV Target (ha)	2013 value (ha)	% change

91D0	0.04	0.04	0.00	na	na	Na

na: not applicable

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

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

Table 8.5 Habitats conservation status assessments

Habitat	Area Assessment	Structure & Functions Assessment	Future Prospects Assessment	Overall Assessment
7110	Unfavourable Bad-Decreasing	Favourable-stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
91D0	Favourable-Stable	Favourable-Stable	Unfavourable Inadequate-Declining	Unfavourable Inadequate-Declining
7120	Unfavourable Bad-Decreasing	Unfavourable Bad-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining
7150	Unfavourable Bad-Stable	Favourable-Stable	Unfavourable Bad-Declining	Unfavourable Bad-Declining

Conclusions

Summary of impacting activities

- Peat cutting still continues at the site and has taken place at 5 locations in the 2004-2010 reporting period. 0.12ha of high bog have been lost in this period due to peat cutting.
- 2.3km of drains on the high bog remain functional and 8.8km remain reduced-functional. The most extensive drainage area is in the southern part of the site where a series of parallel reduced-functional drains flow in a west to east direction. Cutover drainage associated with either currently active or no longer active peat cutting continues to impact on the high bog habitats. In addition, drainage maintenance on agricultural land adjacent to the northern lobe continued in the 2004-2010 period. Drainage is considered the main reason for the decrease in Active Raised Bog habitat in the reporting period (2004-2013).

- No fire events have damaged the high bog in the reporting period. A severe fire event seriously damaged the southern section of high bog in 2001/2. The vegetation has recovered well generally. *Pinus* sp. saplings have germinated in areas that were formerly burnt.

Changes in active peat forming areas

- Although figures indicate a small decrease of (-) 0.10ha in Active Raised Bog in the reporting period, the distribution of the habitat has changed considerably. The former central area **C1** has been re-named as sub-central **Sc7**. This is not a real loss of central ecotope as is deemed to be the result of re-interpretation of the vegetation. Nevertheless actual losses of Active Raised Bog have taken place at the edge of **Sc7** (former C1). The sub-central area **Sc2** in 2004 on the southern lobe has now been merged into **Sc1** as the two areas were found to be linked by sub-central vegetation. Former sub-central areas **Sc3, Sc5** and **Sc6** have all been included as part of the active flush **X**.
- Two new peat forming areas (**Sc8** and **Sc9**) have been described at the site. These new sub-central ecotope areas are the result of a more comprehensive survey in 2013 rather than actual changes in Active Raised Bog.
- The biggest change has been in the re-naming of much of the large inactive flush **X** on the northern lobe of Trien Bog as active flush **X**. This is partly due to more comprehensive surveying which revealed that although the flush is a mosaic of active and inactive flush areas, it is on balance more active than inactive. Also it has recovered from a fire event of 2001/02.

Other changes

- The boundary of the sub-marginal area in the northern lobe was extended towards the margin of the high bog. This was due to more comprehensive surveying and more accurate mapping rather than an improvement of the habitat
- The 2013 survey noted the spread of *Pinus sp*. within the drier sections of active flush **X** and around the wooded flushes. Many plants were less than 2m high and likely to have germinated after the severe fire event that took places in 2001/2. The spread of pines is likely to be an indication of further drying out of the high bog.

Quadrats analysis

There were no quadrats previously recorded on Trien Bog. Three quadrats were recorded in 2013:

- **Qsc1**: Sub-central complex 9+P. Located on the southern lobe of the bog.
- **Qsc2**: recorded on the northern lobe of the bog within what was formerly named central ecotope in 2004, but was found to be sub-central vegetation complex 3/35 in 2013.
- **Qbw1:** This was a small area of birch dominated Bog Woodland within flush **X**, which barely met the criteria for Bog Woodland. The canopy was 30% and tree stem <20cms dbh.

Restoration works

- No restoration works have been undertaken at the site.

Summary of conservation status

- **Active Raised Bog** has been given an **Unfavourable Bad–Declining** conservation status at Trien Bog. Habitat area has slightly decreased in the reporting period. The current area 24.24ha is below the FRV (55.84ha). The S&Fs Assessment 2013 value (15.36ha) is currently above the FRV (12.10ha). This is because the large size of active flush **X**, which extent has increased due to re-interpretation of vegetation. Future Prospects are still considered Unfavourable Bad-Declining as impacting activities (peat cutting and drainage) continue to threaten the habitat.
- **Bog Woodland** has been given an **Unfavourable Inadequate-Declining** conservation status at Trien Bog. The area of birch woodland that (barely) meets the criteria for Bog Woodland is very small (0.04ha). Much of the birch woodland recorded in 2004 is below the canopy criteria (≥30%). Habitat Area has therefore not changed in the reporting period. Habitats S&Fs are considered Favourable-Stable. Although a number of features in the single monitoring carried out failed to reach the minimum pass criteria: *Sphagnum* cover which was <25%; absence of trees >20cms dbh; absence of saplings >1m high and lastly due to the absence of old, senescing and dead trees >10cms dbh. Future Prospects are considered Unfavourable Inadequate-Declining.
- **Degraded Raised Bog** has been given an **Unfavourable Bad-Declining** conservation status at Trien Bog. Habitat Area has slightly decreased due to losses associated with peat cutting. Habitat's S&Fs have remained Stable. Habitat Area and S&Fs are above FRVs, which is considered negative for this habitat. Future Prospects are considered Unfavourable Bad–Declining due to threatening impacting activities.
- **Depressions on peat substrates of the Rhynchosporion** has been given an **Unfavourable Bad-Declining** conservation status at Trien Bog. Habitat Area and quality (S&Fs) are

considered to have not changed in the reporting period. However, Future Prospects are considered Unfavourable Bad-Declining as a result of threatening impacting activities.

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

Recommendations

- **Cessation of peat cutting.**
- **Restoration works** including blocking of high bog functional and reduced-functional drains, as well as cutover drains.
- **Further hydrological and topographical studies** to ascertain the capacity of the high bog to support Active Raised Bog and thus estimate a more accurate favourable reference value.
- **Further botanical monitoring surveys** should be undertaken on the high bog in order to assess change in habitat's conservation status.

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Appendix I Detailed vegetation description of the high bog

Active Raised Bog (7110)

Sub-Central Ecotope Complexes

COMPLEX 3/35

- **Location**: was former **C1** in 2004, now **Sc7**
- **Ground**: firm to soft, but quaking at pool edges
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50% (26-33% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Hummocks/hollows and pools.
- **Tussocks**: absent
- **Degradation or regeneration evidence**: This complex was classed as central complex 35 in 2004. However, comparing descriptions, the area does not appear to have changed and thus its reclassification is considered to be due to interpretation differences rather than actual changes. It is worthwhile noting that the area was classed as complex 6/3/35 in 1994, which under the current classification system would indeed be classed as sub-central ecotope.
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (4-10%), *Carex panicea* (4-10%; higher in places), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Rhynchospora alba* (<4%; higher in places), *Menyanthes trifoliata* (<4%), *Racomitrium lanuginosum* (<4%), *Cladonia uncialis* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. papillosum* (H & P; 4-10%; higher in places), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; 4-10%).
- **Additional comments:** None

Quadrat **Qsc2** was taken within this complex

COMPLEX 9 + P

- **Location**: this complex occurs in a small area of **Sc1**
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: slight depression/gentle slope
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50% (51-75% in places)
- ***Narthecium* cover**: <4% (4-10% in places)
- **Micro- topography**: Hummocks/hollows, lawns and pools.
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (11-25%), *Carex panicea* (<4%), *Narthecium ossifragum* (<4%), *Trichophorum germanicum* (<4%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Cladonia uncialis* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. tenellum* (H; <4%), *S. papillosum* (H, L & P; 11-25%; higher in places), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; 4-10%; higher in places).
- **Additional comments:** This complex occurs in localised areas to the east of **Sc1**. This area of sub-central ecotope approaches central ecotope quality. Where pools are few or absent and the *Calluna* is robust, this becomes complex 9/7/10 at two locations near the edges of flush **X** and **Y**. The presence of species such as *Molina caerulea, Aulacomnium palustre* and *Vaccinium oxycoccos* are indicative of some flushing. The high cover of *Cladonia* is likely to be excluding some of the *Sphagnum capillifolium* beneath. Another variant of 9/7+P is complex 9/7/6+P located at the south-eastern side of **Sc1.** This is a poorer sub-central community with an increase in *Narthecium* (4-10%) and poor pool *Sphagnum* cover.

Quadrat **Qsc1** was taken within this complex.

COMPLEX 6/9 + P

- **Location**: this complex dominates **Sc1** and is localised in the northern lobe
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm

- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 11-25%
- ***Sphagnum* cover**: 34-50% (26-33% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Hummocks/hollows, flats, lawns and pools.
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%; higher in places), *E. vaginatum* (4-10%; higher in places), *Carex panicea* (4-10%, locally 11-25%), *Narthecium ossifragum* (4-10%), *Trichophorum germanicum* (<4%), *Rhynchospora alba* (<4%), *Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Sphagnum capillifolium* (H; 11-25%; lower in places), *S. papillosum* (H, L & P; 11-25%; lower in places), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; 4-10%).
- **Additional comments:** This complex joins the area between the former **Sc1** and **Sc2**, so that it becomes one sub-central area (**Sc1)**. The change is due to interpretation. The inter-pool areas are quite variable. In places they can be firm. Where *Narthecium* is absent, it becomes the somewhat better quality complex 9+P described above.

  The description above was recorded in the south-east lobe of the high bog where this complex dominates **Sc1**. Hummocks of *Sphagnum fuscum* and particularly *S. austinii* are very rare on this lobe and there were also very small amounts of the western indicators *Racomitrium lanuginosum*, *Pleurozia purpurea* and *Campylopus atrovirens* although the latter species becomes quite common where the complex grades into the sub-marginal complex 4/9A. However, this complex (6/9 + P) largely grades into the sub-marginal complex 6/3+P. This occurs where there is a decrease in *Sphagnum* cover as well as in *Eriophorum angustifolium* and *E. vaginatum* and an increase in the cover of *Carex panicea* and *Narthecium ossifragum*.

  This complex was also recorded in two small areas in the west of the northern lobe **(Sc8** and **Sc9)**. These areas were burned in 2001/02 and thus the cover of *Cladonia portentosa* is <4% and *Campylopus introflexus* is present. Species cover is similar to above with the following differences noted: *Erica tetralix* (4-10%), *Rhynchospora alba* (4-10%). The *Sphagnum* covers were as follows: *S. capillifolium* (H; 4-10%), *S. tenellum* (H; <4%), *S. fuscum* (H; <4%), *S. subnitens* (H; <4%), *S. papillosum* (H & P; 4-10%), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; 4-10%).

FLUSH FX

- **Location**: northern lobe
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 26-33% and 34-50% in places (where it was not burned in 2001/2)
- **Macro-topography**: gentle slope
- **Pools**: absent (<4% in places)
- ***Sphagnum* cover**: 26-33% (11-25% in places)
- ***Narthecium* cover**: absent (<4% in places)
- **Micro- topography**: Hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (4-10%; locally 11-25%), *Calluna vulgaris* (11-25%; 26-33% in places), *Erica tetralix* (<4%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Carex panicea* (<4%), *Aulacomnium palustre* (<4%), *Pleurozium schreberi* (4-10%; 11-25% in places), *Hylocomium splendens* (4-10%), *Juncus effusus* (<4%), *Vaccinium oxycoccos* (<4%), *Empetrum nigrum* (<4%), *Polytrichum strictum* (<4%), *Cladonia uncialis* (<4%), *Cladonia portentosa* (26-33%), *Sphagnum capillifolium* (H; 4-10%; higher in places), *S. papillosum* (H & Hl; 4-10%), *S. fallax* (Hl; <4%), *S. palustre* (H; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional Comments***:* The above description was taken from the north of X, just outside of X1, the wooded flush). The *Sphagnum* cover within this flush is low considering it is classed as an active flush. However, the high cover of *Cladonia portentosa* may, at least partially, be the reason for the low *Sphagnum* cover as it dominates large areas of hummocks. Inactive patches dominated by a higher cover of *Molinia caerulea* are present within the flush. However, these areas are usually quite small and were thus not mapped during the current survey although some points were taken.

  The former **Sc3** as mapped in the 2004 survey has now been incorporated into the main flush **X** area and is shown as a dot of sub-central complex 9/7/10.

FLUSH X1

- **Location**: Around the Bog Woodland
- **Ground**: soft
- **Physical indicators**: absent

- ***Calluna* height**: 40-50cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 34-50%, 11-25% in places
- ***Narthecium* cover**: absent
- **Micro- topography**: hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (4-10%, up to 25% in places), *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (11-25%), *E. vaginatum* (<4%), *Vaccinium myrtillus* (<4%), *Vaccinium oxycoccos* (<4%), *Aulacomnium palustre* (4-10%, 11-25% in places), *Hylocomium splendens* (4-10%), *Pleurozium schreberi* (11-25%), *Polytrichum strictum* (<4%), *Empetrum nigrum* (<4%), *Sphagnum capillifolium* (H; 11-25%), *S. palustre* (Hl; <4%), *S. fallax* (Hl; <4%), *Polytrichum strictum* (<4%), *Cladonia portentosa* (11-25%).
- **Additional comments:** There are six wooded flush areas within the larger Active Flush X. They are numbered Wooded flush X1 –X6. This Wooded flush X1 is the largest and is comprised of an area of scattered small birch trees in a wet flush area around the bog woodland. The canopy is 2-3m high and a few trees up to 4m high, and diameter at breast height (dbh) <10cm's. The trees are too few and too small to be classified as woodland.
- Wooded flush **X3** is quite similar to wooded **flush X1**. It has a few birch trees 6-8m high, but most are 1-2m high. There is a drain flowing through the middle of it, which goes underground. A pine tree (*Pinus contorta)* 9m high has given rise to many saplings 1-2m high generating around the flush after the burning event in 2003. It seems the birch is expanding. It almost links up with wooded flush **X4** located < 25m to the south-east.
- Wooded flush **X6** is a newly mapped area just north of wooded flush **X3.** It is basically an active flush with scattered birch trees, mostly 1-2m and a few trees >5m high. It seems that birch is expanding in this area as it was not mapped in 2004.

FLUSH X4

- **Location**: in the centre of flush X
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 40-50cm

- ***Cladonia* cover**: <4-10%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10% and 11-25% in some places
- ***Narthecium* cover**: absent
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: Molinia 4-10%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Betula pubescens* 4-10%, *Molinia caerulea* (4-10% and 11-25% towards the edge of the trees), *Calluna vulgaris* (4-10%), *Eriophorum. vaginatum* (<4%), *Vaccinium myrtillus* (<4%), *Vaccinium oxycoccos* (<4%), *Juncus effusus* (<4%), *Pteridium aquilinum* (<4%), *Aulacomnium palustre* (4-10%), *Hylocomium splendens* (4-10%), *Pleurozium schreberi* (11-25%), *Polytrichum strictum*., *Sphagnum capillifolium* (H; 4-10%), *S. palustre* (H; 4-10%), *S. fallax* (4-10%), *Cladonia portentosa* (11-25%).
- **Additional comments** Although *Sphagnum* cover is quite low and partly hidden under the cushions of *Hylocomium* and *Pleurozium,* the ground is wet and flushy under-foot. There is one Birch tree *Betula pubescens* (7m high) and 25cm dbh, and a few trees around 5m high, but most are <2m high.
- Wooded flush **X2** is similar to wooded flush **X4**. The birch trees are mostly 1-3m high with a few >5m high and the canopy is <5%.
- A swallow hole is located at the northern edge of Flush X and east of Wooded Flush 2. There is a depression with water surrounded by willow (*Salix cinerea*) scrub covering an area of 5m x 5m and a single Rowan (*Sorbus aucuparia*) tree about 6m high. There is a second smaller area of willow scrub 20m to the north of this one.

FLUSH X5

- **Location**: south-western part of northern lobe
- **Ground**: soft
- **Physical indicators**: burnt in 2001/02; burnt dead standing *Betula* stems (2.0-4.0m in height)
- ***Calluna* height**: 41-50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: on a plateau
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%

- ***Narthecium* cover**: absent (<4% in places)
- **Micro- topography**: Hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (4-10%), *Calluna vulgaris* (26-33%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (4-10%), *Vaccinium oxycoccos* (<4%; 4-10% in places), *V. myrtillus* (<4%), *Myrica gale* (<4%), *Pteridium aquilinum* (<4%), *Hedera helix* (<4%), *Aulacomnium palustre* (4-10%), *Pleurozium schreberi* (4-10%; 11-25% in places), *Hylocomium splendens* (4-10%), *Empetrum nigrum* (<4%), *Polytrichum strictum* (<4%), *Rhytidiadelphus squarrosus* (<4%), *Cladonia portentosa* (<4%), *Sphagnum capillifolium* (H; 4-10%; 11-25% in places), *S. papillosum* (H & Hl; 4-10%), *S. fallax* (Hl; <4%), *S. cuspidatum* (Hl; <4%).
- **Additional comments:** There is no canopy cover in this wooded flush except for a very small area in the very west where there a number (ca. ten) of 3.0-4.0m *Betula pubescens* trees. However, even here the canopy cover is <5%. Over most of the flush, the *Betula* is much smaller (mostly 1.0-2.0m). The hummocks of *Sphagnum palustre* appear to be largely confined to the bases of the taller *Betula* trees, and thus are more frequent in the west of the flush though a small number of these hummocks were also found in the very east of the flush where there are two or three trees reaching 3.0m tall. *Sphagnum fallax* is also more frequent in the west of the flush carpeting a relatively large area in one location. *S. cuspidatum* is found in the occasional wet hollows and while the cover of *Vaccinium oxycoccos* is low it is widespread. One large tree stump was recorded within the flush with a diameter of 40cm estimated at the base.

FLUSH FY

- **Location**: south-east lobe
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 34-50%
- **Macro-topography**: slight depression
- **Pools**: <4%
- ***Sphagnum* cover**: 26-33% (34-50% in places)
- ***Narthecium* cover**: <4%
- **Micro- topography**: Hummocks/hollows
- **Tussocks**: absent

- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (<4%; locally 11-25%), *Calluna vulgaris* (26-33%), *Erica tetralix* (4-10%), *Eriophorum angustifolium* (4-10%), *E. vaginatum* (4-10%), *Carex panicea* (<4%), *Rhynchospora alba* (<4%), *Narthecium ossifragum* (<4%), *Dicranum scoparium* (<4%), *Aulacomnium palustre* (<4%), *Pleurozium schreberi* (4-10%), *Hylocomium splendens* (<4%), *Juncus effusus* (<4%), *Pteridium aquilinum* (<4%), *Trichophorum germanicum* (<4%), *Cladonia uncialis* (<4%), *Cladonia portentosa* (34-50%), *Sphagnum capillifolium* (H; 4-10%; higher in places), *S. tenellum* (H; <4%), *S. papillosum* (H, Hl & P; 4-10%), *S. palustre* (H & Hl; 4-10%), *S. fallax* (Hl; <4%), *S. cuspidatum* (Hl & P; <4%), *S. denticulatum* (P; <4%).
- **Additional comments:** The *Sphagnum* cover within this flush is variable with hummocks being quite firm in places and being largely dominated by *Cladonia portentosa*. However, the hollows are very soft and have a high *Sphagnum* cover with the moderate cover of *S. palustre* being particularly notable. A very small area of *S. fallax* was noted as well as a 1.5 – 2.0m *Betula pubescens*. One 0.5m *Rhododendron ponticum* was also recorded in flush Y.

FLUSH F1

- **Location**: close to the north-eastern perimeter of the northern lobe
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: partial depression
- **Pools**: <4%
- ***Sphagnum* cover**: 34-50% in places
- ***Narthecium* cover**: absent
- **Micro- topography**: Hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Betula pubescens* (4-10%), *Calluna vulgaris* (11-25%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (4-10%), *Aulacomnium palustre* (<4%), *Pleurozium schreberi* (11-25%), *Juncus effusus* (4-10%), *Vaccinium oxycoccos* (<4%), *Polytrichum strictum* (<4%), *Dryopteris sp.*(<4%), *Cladonia portentosa* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H & Hl; 4-10%), *S. palustre* (H & Hl; <4%), *S. fallax* (H & Hl; 11-25%), *S. cuspidatum* (Hl; <4%).

- **Additional comments:** The description above applies to the area mapped as flush **F1** in 2005. Approximately ten *Betula* trees of 1.5 – 2.5m in height are present within this area. This flush appears to be linked to another flush (not mapped in 2005) to the north-east of it that in turn appears to be linked to the cutover. Both these areas are mapped together as flush **F1**. The area between the flushes is very wet and supports sub-central type vegetation, but due to its small size is included within flush W. *Eriophorum vaginatum* (11-25%) and *E. angustifolium* (11-25%) dominates in this area along with *Sphagnum magellanicum* (11-25%), *S. papillosum* (11-25%) and *S. cuspidatum* (4-10).

FLUSH F2

- **Location**: Located at the northern edge of the site, near the bog margin, just north-west of flush F1
- **Ground**: very soft
- **Physical indicators**: absent
- ***Calluna* height**: 20-30cm
- ***Cladonia* cover**: absent
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25% in hollows mainly
- ***Narthecium* cover**:
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (<4%), *Eriophorum vaginatum* (33-50%), *E. Angustifolium* (4-10%), *Vaccinium myrtillus* (<4%), *Vaccinium oxycoccos* (<4%), *Aulacomnium palustre*(<4%), *Hylocomium splendens* (4-10%), *Pleurozium schreberi* (11-25%), *Polytrichum* sp., *Sphagnum fallax* (H; 11-25%), *S. capillifolium* (4-10%), *S. magellanicum* (<4%), *S. palustre* (H; <4%%), *Aulacomnium palustre* (4-10%), *Polytrichum strictum* (4-10%).
- **Additional comments** This is a small linear flush, with standing water below the surface vegetation.

FLUSH U

Flush **U** is another small wet flush area north of the northern edge of the main flush X. *Sphagnum* cover is 4-10% overall. The main species include; *Molinia caerulea* (4-10%), *Calluna vulgaris* (11-33%),

E. vaginatum (11-25%), *E. angustifolium* (4-10%), *Vaccinium myrtillus* (<4%), *Vaccinium oxycoccos* (<4%), *Aulacomnium palustre*(<4%), *Hylocomium splendens* and *Pleurozium schreberi* (11-25%), *Polytrichum strictum* (<4%), *Sphagnum capillifolium* (<4%), *S. palustre* (H; <4%%), *Dryopteris sp.* (<4%).

Degraded Raised Bog (7120)

Sub-Marginal Ecotope Complexes

COMPLEX 9/7/3 +P

- **Location**: North of flush X1, but localized around the northern lobe
- **Ground**: firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% higher in places, often elongated
- ***Sphagnum* cover**: 11-25%, but in places higher 26-33% or lower 4-10%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows/pools/flats
- **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* (<4%), *Rhynchospora alba* (<4%), *Carex panicea* (4-10, locally 11-25%), *Menyanthes trifoliata,* (<4%), *Sphagnum cuspidatum (*P; 4-10%*),S . denticulatum (*P; 4%*), S. papillosum* (H; <4%), *S. magellanicum* (H; <4%), *S. capillifolium* (H; 11-25%), *S. austinii* (H; <4%), *S. fuscum* (H; <4%), *Campylopus atrovirens* (<4%), *Cladonia uncialis* (<4%).
- **Additional comments:** The *Sphagnum* cover in the pools is quite variable, from good cover with *S. cuspidatum* and *S. denticulatum* to absent. This complex is also present in the west and south of the northern lobe, which was burned in 2001/02. In these areas the cover of *Cladonia portentosa* is lower (<4%) and that of *Narthecium ossifragum* (4-10%; 11-25% in places) is higher.
  In places such as north of flush X the pools are elongated and more or less oriented in a NW/SE direction and this is complex 9/7/3+TP. The inter-pool areas are also variable, from quite firm with <10% *Sphagnum* and high *Carex panicea* to softer with >11% *Sphagnum* cover. This grades

into complex 9/7/3, in areas in the north-west of the site, south of **Sc7**, which were burnt in 2003. There Pools were very few (<4%). *Narthecium* cover is 4-10% and *Cladonia* was <4%.

COMPLEX 9/7

- **Location**: South of **Sc7**
- **Ground**: soft to very soft
- **Physical indicators**: absent
- ***Calluna* height**: 10-20cm
- ***Cladonia* cover**: 11-25%, up to 33% in places
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25%, in places 33%
- ***Narthecium* cover**: <4%
- **Micro- topography**: Low hummocks/hollows
- **Tussocks**:
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (11-25%), *E. angustifolium* (4-10%), *Cladonia portentosa* (11-25%, up to 33% in places), *Carex panicea* (<4%), *Menyanthes trifoliata*, (<4%), *Sphagnum cuspidatum (<4%), S. papillosum* (H; 4-10%), *S. tenellum* (H; <4%), *S. capillifolium* (H; 11-25%).
- **Additional comments:** Occurs in localised areas adjacent to active flushes.

COMPLEX 6/3 +P

- **Location**: South-east lobe
- **Ground**: firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% higher in places often elongated
- ***Sphagnum* cover**: 11-25%, in places 4-10%
- ***Narthecium* cover**: 4-10%, in places 11-25%
- **Micro- topography**: Low hummocks/hollows/pools/flats
- **Tussocks**: absent

- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *E. angustifolium* (<4%), *Narthecium ossifragum* (11-25%), *Rhynchospora alba* (<4%), *Carex panicea* (4-10%, locally 11-25%), *Sphagnum cuspidatum* (P; 4-10%),*S . denticulatum* (P; <4%), *S. papillosum* (H; <4%), *S. capillifolium* (H; 4-10%), *Racomitrium lanuginosum (<4%), Menyanthes trifoliata* (<4%), *Drosera anglica* (<4%), *Cladonia portentosa* (4-10%), *Cladonia uncialis* (<4%).
- **Additional comments:** The description above was recorded in the south-east lobe where this complex grades into sub-central complex 6/9+ P where the cover of *Sphagnum* and *Eriophorum* spp. increases and the cover of *Carex panicea* and *Narthecium ossifragum* (11-25%) decreases. *Huperzia selago* was recorded where this complex occurs to the south of the flush **Z**. *Myrica gale* was recorded towards the eastern extent of this complex where, in general, there were fewer pools.

  This complex is also present in the west and south of the northern lobe in the area that was burned in 2001/02. Here the cover of *Cladonia portentosa* is lower (<4%) and that of *Eriophorum vaginatum* (4-10%) is higher while the *Sphagnum* cover was recorded as being 26-33% in places (but mostly 11-25%). Otherwise the species composition is very similar. This is a poorer sub-marginal community where *Narthecium* and *Carex panicea* predominate over *Eriophorum* spp. and *Sphagnum* cover in the pools is often poor (<4%).

COMPLEX 4/9A

- **Location**: south of **Sc1**
- **Ground**: soft and very wet
- **Physical indicators**: largely absent but *Campylopus introflexus* <4%
- ***Calluna* height**: 11-20cm
- ***Cladonia* cover**: 4-10%
- **Macro-topography**: flat/gentle slope
- **Pools**: <4% (higher when including shallow poorly defined 'pools')
- ***Sphagnum* cover**: 11-25%
- ***Narthecium* cover**: 4-10% (<4% in places)
- **Micro- topography**: Hummocks/hollows and shallow poorly defined 'pools'
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (11-25%), *Narthecium ossifragum* (4-10%), *Rhynchospora alba* (11-25%), *Carex panicea*

(<4%), *Trichophorum germanicum* (<4%), *Campylopus atrovirens* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (Hl; 11-25%), *S. fuscum* (H; <4%), *S. cuspidatum* (Hl; <4%), *Cladonia portentosa* (4-10%), *Cladonia uncialis* (<4%).

- **Additional comments:** the shallow poorly defined 'pools' are mostly open water with little *Sphagnum* cover.

Marginal Ecotope Complexes

COMPLEX 3/6

- **Location**: this complex is found across the entire high bog marginal ecotope
- **Ground**: firm
- **Physical indicators**:
- ***Calluna* height**: 20-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle to steep slope
- **Pools**: <4%
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: low hummocks / hollows
- **Tussocks**: *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (26-33%), *Erica tetralix* (<4%), *Trichophorum germanicum* (4-10%), *Narthecium ossifragum* (4-10%*Carex panicea* (11-25%), *Eriophorum vaginatum* (<4%), *Sphagnum cuspidatum (<4%), S. capillifolium* (H; <4%, in places 4-10%), *S. tenellum* (H; <1%), *S. subnitens* (H; <1%), *Hypnum jutlandicum* (<4%), *Myrica gale* (<1%).
- **Additional comments**: Where this complex occurs to the east of flush **X** in the northern lobe of the site, a series of swallow holes are found extending in a NNE/SSW direction. Tall robust *Calluna vulgaris*, *Rubus fruticosus*, *Blechnum spicant*, *Pteridium aquilinum* and *Molinia caerulea* are found in and around the swallow holes. There is a slope rising up to the east from these swallow holes.

  In some steep slope areas, this complex becomes complex 3/6/4 with *Rhynchospora alba* (4-10%) becoming frequent in depressions and run-off channels. Where this complex occurs in the west of the northern lobe (in the area burnt in 2001/02) *Campylopus introflexus* was frequent.

COMPLEX 3/6 + P

- **Location**: north of northern lobe
- **Ground**: firm (soft in places)
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 11-25%
- **Macro-topography**: gentle slope
- **Pools**: 4-10% (11-25% in places)
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 4-10% in places
- **Micro- topography**: Hummocks/hollows, flats and tear pools
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (4-10%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (26-33%), *Rhynchospora alba* (4-10%), *Trichophorum germanicum* (<4%), *Menyanthes trifoliata* (<4%), *Sphagnum capillifolium* (H; <4%), *S. papillosum* (H & Hl; <4%), *S. denticulatum* (P; <4%), *S. cuspidatum* (P; <4%; 4-10% in places), *Cladonia portentosa* (11-25%).
- **Additional comments:** None.

COMPLEX 3/7

- **Location**: north-east of northern lobe
- **Ground**: firm to soft
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: <4% (4-10% in places)
- **Micro- topography**: Hummocks/hollows and flats
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent

- **Species cover**: *Calluna vulgaris* (34-50%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (<4%), *Carex panicea* (11-25%), *Trichophorum germanicum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (Hl; <4%), *S. cuspidatum* (Hl; <4%), *Cladonia portentosa* (26-33%), *Cladonia uncialis* (<4%).
- **Additional comments:** None.

COMPLEX 2/7

- **Location**: south of northern lobe (amongst drains)
- **Ground**: firm (but very 'slippery')
- **Physical indicators**: bare peat (4-10%); *Campylopus introflexus* (<4%); old drains cross the high bog here in a west-east direction
- ***Calluna* height**: 21-30cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: flat/gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Hummocks/hollows and flats
- **Tussocks**: *Trichophorum germanicum* (11-25%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (11-25%; 26-33% in places), *Erica tetralix* (<4%), *Eriophorum vaginatum* (<4%), *E. angustifolium* (<4%), *Narthecium ossifragum* (4-10%), *Carex panicea* (4-10%), *Trichophorum germanicum* (11-25%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (Hl; <4%), *S. cuspidatum* (Hl; <4%), *Cladonia portentosa* (<4%).
- **Additional comments:** None.

FLUSH X

- **Location**: Southern part of flush X
- **Ground**: firm to soft
- **Physical indicators**: absent
- ***Calluna* height**: 40-50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: gentle slope
- **Pools**: absent

- ***Sphagnum* cover**: 4-10%
- ***Narthecium* cover**: absent
- **Micro- topography**: hummocks/hollows
- **Tussocks**: *Molinia* 11-25%
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* 26-33% and up to 50% in places, *Calluna vulgaris* (11-25%), *Erica tetralix* (<4%), *Eriophorum vaginatum* (4-10%), *Vaccinium myrtillus* (<4%), *Vaccinium oxycoccos* (<1%), *Aulacomnium palustre* (<1%), *Hylocomium splendens* (<4%), *Pleurozium schreberi* (4-10%) *Sphagnum capillifolium* (H; 4-10%), *Betula pubescens* (<4%).
- **Additional comments:** This inactive flush vegetation is in localised areas within the larger active flush in X. It is found mainly in the western side of flush **X**.
- A band of inactive flush habitat occurs extends out from the southern margin of flush X. It is a wet flushy area parallel to the drain B2J comprised of mainly *Eriophorum angustifolium* (11-25%), *Carex panicea* (4-10%), *Molinia caerulea* (4-10%), *Sphagnum cuspidatum* (<4%) and *S. papillosum* (<4%), It seems there may have been some disturbance to the vegetation here. And this is regeneration. This flush slopes down towards the drain.

FLUSH Z

- **Location**: south-east lobe
- **Ground**: soft
- **Physical indicators**: absent
- ***Calluna* height**: 31-40cm
- ***Cladonia* cover**: 26-33%
- **Macro-topography**: gentle slope
- **Pools**: absent
- ***Sphagnum* cover**: 11-25% (4-10% in places)
- ***Narthecium* cover**: 4-10%
- **Micro- topography**: Hummocks/hollows and flats
- **Tussocks**: absent
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Molinia caerulea* (26-33%), *Calluna vulgaris* (11-25%), *Erica tetralix* (4-10%), *Carex panicea* (11-25%), *Eriophorum angustifolium* (<4%), *E. vaginatum* (<4%), *Sphagnum capillifolium* (H; 4-10%), *S. papillosum* (H; 4-10%).
- **Additional comments:** None.

Face bank Complexes

COMPLEX 1

- **Location**: this complex was found along the bog margin
- **Ground**: firm
- **Physical indicators**: bare peat (4-10%)
- ***Calluna* height**: <50cm
- ***Cladonia* cover**: <4%
- **Macro-topography**: steep slope
- **Pools**: absent
- ***Sphagnum* cover**: generally absent but <4% in places
- ***Narthecium* cover**: <4%
- **Micro- topography:** tall robust *Calluna vulgaris*/low hummocks
- **Tussocks:** *Trichophorum germanicum* (<4%)
- **Degradation or regeneration evidence**: absent
- **Species cover**: *Calluna vulgaris* (76-90%), *Erica tetralix* (4-10%), *Trichophorum germanicum* (<4%), *Narthecium ossifragum* (<4%), *Sphagnum capillifolium* (H; <4%), *S. tenellum* (H; <4%), *Hypnum jutlandicum* (<4%).
- **Additional comments**: None.

Bog Woodland

Bog Woodland BW1

A small area of birch (*Betula pubescens*) dominated Bog Woodland occurs in the northern lobe of the site. The Bog Woodland area is much reduced compared to the area of Bog Woodland mapped in 2004. This is because the criteria used to define this ecotope have changed to link in with criteria used in the National Parks and Wildlife Service National Survey of Native woodland, by Perrin *et al*. (2008). One of the criteria is that the tree canopy cover is at least 30%. Only a small area (0.036ha.) has a canopy of up to 30% cover and this defines the extent of the Bog Woodland habitat. The median height of the trees is 4m with some up to 8m and some <4m. There are no other tree species present. Beneath the canopy, the bryophyte cover is 75-80%, but only 10-15% of this is *Sphagnum* spp., which include *S. capillifolium,* and *S. palustre*. The latter species is associated with flushes. The most abundant other mosses, which form hummocks are *Pleurozium schreberi* and *Hylocomium splendens*. Low shrubs include *Calluna* (10%) and *Vaccinium myrtillus* (<4%). *Molinia*

caerulea is also present. A number of other species are present, which are good indicators of flushing. These included; *Aulacomnium palustre, Vaccinium oxycoccos* and *Polytrichum strictum.*

Surrounding the Bog Woodland area is a wooded flush **X1**, dominated by an open canopy of birch trees (2 - 4m high and <10cm dbh). This was included as Bog Woodland in 2004. There are five other wooded flushes (wooded flush **X2-X6**) on Trien Bog.

A quadrat 10m x 10m was taken at this location and the results are given below in Appendix III.

Appendix II Photographical records

Photograph Number	Aspect	Type	Feature	Date
DSCN0849	N	Overview	Qbw1	05/02/2013
DSCN0855	NE	Overview	Qsc2	06/02/2013

Appendix III Quadrats

Ecotope type	**Sub-central**	**Sub-central**
Complex Name	**9+P**	**3/35**
Quadrat Name	Qsc1	Qsc2
Easting	165647.61	165101.88
Northing	275252.06	276198.22
Date	04/02/2013	06/02/2013
Firmness	Very soft	Soft
Burnt	No	No
Algae in hollows %	Absent	Absent
Algae in pools %	Absent	Absent
Bare peat %	Absent	Absent
High hummocks %	Absent	Absent
Low hummocks %	34-50	34-50
Hollows %	4-10	4-10
Lawns %	1-3 (several indiv)	Absent
Pools %	11-25	11-25
Pool type	Interconnecting	Interconnecting
S.austinii hum type	Absent	Absent
S.austinii hum %	Absent	Absent
S.austinii height(cm)	Absent	Absent
S.fuscum hum type	Absent	Absent
S.fuscum hum %	Absent	Absent
S.fuscum height(cm)	Absent	Absent
Leucobryum glaucum	Absent	Absent
Trichophorum type	Flats	Absent
Trichophorum %	1-3 (several indiv)	Absent
S.magellanicum %	Absent	Absent
S.cuspidatum %	4-10	4-10
S.papillosum %	11-25	4-10
S.denticulatum %	1-3 (many indiv)	1-3 (many indiv)
S.capillifolium subsp. rubellum %	11-25	11-25
S.tenellum %	1-3 (several indiv)	1-3 (many indiv)
S.subnitens %	Absent	Absent
R.fusca %	Absent	Absent
R.alba %	1-3 (many indiv)	4-10
N.ossifragum %	1-3 (many indiv)	1-3 (many indiv)

Sphag pools %	11-25	11-25
Dominant pool Sphag	S.cuspidatum	S.cuspidatum
Sphag lawns %	1-3 (several indiv)	Absent
Sphag humm %	26-33	11-25
Sphag holl %	1-3 (few indiv)	4-10
Total Sphag %	34-50	34-50
Hummocks indicators	Absent	Absent
Cladonia portent %	4-10	11-25
Other Cladonia sp	c.unci=	C. uncialis and stick clad (kd)
C. panicea %	1-3 (many indiv)	4-10
Calluna cover %	11-25	26-33
Calluna height(cm)	11-20	11-20
Other NotableSpecies	E.vag 20% E.ang 5% D.ang	E.ang <4 E.vag <4 mylia
Other comment		Raco & S.aust adj to quad

Note: There is no quadrat data for 2004, as the quadrats were only set up in 2013.

91D0 Bog woodland: Assessment sheet Trien Bog

Site name	002110 Trien	**Recorders**	KD/WC	**Photo no.s**	0849
Stop Number	1	**Date**	05/02/2013	**Grid ref**	KD

Positive indicator species	✓	**Negative indicator species**	**% Cover**
Trees and woody species		*Pteridium aquilinum*	1%
Betula pubescens	✓	*Rubus* agg.	
Salix aurita		*Rhododendron ponticum*	
Salix atrocinerea		Non-native conifer species	
Dwarf shrubs, herbs & ferns		List:	
Dryopteris dilatata	✓		
D. carthusiana.			
Carex rostrata			
Juncus effusus			
Molinia caerulea	✓		
Vaccinium oxycoccos	✓		
Empetrum nigrum	✓		
Vaccinium myrtillus	✓		
Epilobium palustre		Others	
Calluna vulgaris	✓	List:	
Potentilla erecta		*Sphagnum capillifolium*	
Mosses		*Polytrichum strictum*	
Polytrichum commune	✓	*Eriophorum vaginatum*	
Sphagnum fimbriatum		*Usnea sp.*	2%
Sphagnum fallax			
Sphagnum palustre	✓		
Hylocomium splendens	✓		
Aulacomnium palustre	✓		
Pass = *Betula pubescens*, *Sphagnum* species plus ≥5 of the other species	Pass	Pass = Negative indicator species <10%	Pass

Structural data	**Result**	**Stop level**	**Passes**
Median canopy height >4m	P (4m)	≥7 passes = pass	
Total canopy cover >30% of plot	P(30%)	<7 passes = fail	
Betula pubescens >50% of canopy	P(100%)		
Dwarf shrub layer cover <50%	P(10-15%)	**Result=9**	Pass
Calluna cover <40%	P(10%)		
% *Sphagnum* cover (pass = ≥25%)	F(10-15%)		
% Bryophyte cover (pass = ≥50%)	P(75-80%)		

Note: *Pinus sylvestris* 0%

Target tree species dbh	✓	**Old trees & dead wood (any species)**	**Result**
Betula pubescens 5-10 cm 10-20 cm >20 cm	✓ x ✓ x	No. of old/senescing trees or dead stems >10cm No. of standing dead trees >10cm No. of fallen dead trees/branches >10cm	0 2 0
Pass = Over all stops each size class represented	Fail	Pass = 1+ old/senescing trees (or dead stems) in >25% of stops and 4+ standing dead or fallen dead in total number of stops	Fail
Betula pubescens regeneration			
Pass = ≥1 sapling >1m in all stops	Fail		

Appendix IV Survey maps

Raised Bog Monitoring & Assessment Survey 2013

Map 1: Ecotopes Map and Quadrats

Ecology and Environmental Consultants Ireland Ltd.

Trien SAC (002110)
Co. Roscommon

1:8,000

N

0 100 200 400 600 800 Meters

Legend

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

Raised Bog Monitoring & Assessment Survey 2013

Map 2: Vegetation community complexes

Ecology and Environmental Consultants Ireland Ltd.

Trien SAC (002110)
Co. Roscommon

1:8,000

N

0 115 230 460 690 920 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 & Assessment Survey 2013

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

Ecology and Environmental Consultants Ireland Ltd.

Trien SAC (002110)
Co. Roscommon

1:8,000

N

0 110 220 440 660 880 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