

Carrowmore Lake Complex SAC (site code 000476)

Conservation objectives supporting document

- blanket bogs and associated habitats

NPWS

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1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the EU Habitats Directive 92/43/EEC. It is defined in positive terms such that a habitat type or species must be prospering and have good prospects of continuing to do so.

The Scoping Study and Pilot Survey of Upland Habitats (Perrin *et al.*, 2009) was commissioned by the National Parks and Wildlife Service (NPWS) with the primary remit of devising an appropriate strategy and methodologies for conducting a National Survey of Upland Habitats (NSUH). Four phases of the NSUH have since been completed between 2010 and 2014. The principle aims of the NSUH are to map all habitats within a site and to assess the conservation condition of the relevant Annex I habitats, listed in Table 1 below.

The conservation objectives attributes and targets, which are based on the monitoring criteria developed by the NSUH, have been applied to the Annex I habitats listed as Qualifying Interests for Carrowmore Lake Complex SAC (see Table 1 and Section 2).

Carrowmore Lake Complex SAC was surveyed by Foss & McGee (1987) and Douglas *et al.* (1989) as part of a wider blanket bog survey project across Ireland carried out by NPWS between 1987 and 1991 (see Conaghan, 2000).

Table 1: Annex I habitats that occur in Irish uplands and which are primary focus habitats for the NSUH. Habitats in bold are those that are listed as Qualifying Interests for Carrowmore Lake Complex SAC.

Habitat code	Habitat name
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*
7130	Blanket bogs (*if active bog)
7140	Transition mires and quaking bogs
7150	Depressions on peat substrates of the Rhynchosporion
7230	Alkaline fens
8110	Siliceous screes of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)
8120	Calcareous and calcshist screes of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>)
8210	Calcareous rocky slopes with chasmophytic vegetation
8220	Siliceous rocky slopes with chasmophytic vegetation

* Denotes a priority habitat under the EU Habitats Directive

1.1 Carrowmore Lake Complex SAC

Carrowmore Lake Complex SAC is 3,648ha in extent. It comprises a large lake and blanket bog complex situated on the outskirts of Bangor in north-west Mayo (O.S. Discovery Series map 22 and 23). Carrowmore Lake occupies the western section of the SAC, with blanket bog present east of the lake. Topographically the SAC is hilly with flat areas present towards the lake. The highest point, at 199m, is found at Largan More in the east. Rivers within the SAC include the Glencullin River and its

tributary, Muingnakinkee. Geologically the west is underlain by quartzite, gneisses, schists, with shale and sandstone present in the east.

1.2 Mapping methodology

A detailed habitat mapping survey of Carrowmore Lake Complex SAC, utilising the methodology presented in Perrin *et al.* (2014), has not been conducted. Therefore, the data currently available are not sufficient to facilitate the production of an accurate habitat map.

All current relevant datasets for Annex I habitats were summarised within the GIS files associated with NPWS (2013) and these were utilised to calculate an approximate area for 7130 Blanket bogs (* if active bog) in Carrowmore Lake Complex SAC. There were no data with which to estimate the approximate areas of 7150 Rhynchosporion depressions in the SAC.

1.3 Potential for habitat restoration

Restoration management for 7130 Blanket bogs (* if active bog) in this SAC is required, as the conservation objective for the habitat is to restore favourable conservation condition here. Areas that might be restored to active blanket bog could include inactive bog, bare eroding bog and recent cutover bog, and also areas of drained deep peat or older cutovers which currently support other types of vegetation such as heath. These latter areas may currently be classified as other Annex I habitats. Restoration of priority 7130 habitat may therefore result in loss in the area and distribution of other Annex I habitats that are Qualifying Interests. If such scenarios are identified by restoration management plans, the conservation objectives for these other Qualifying Interests should be adjusted accordingly.

2 Conservation objectives

A site-specific conservation objective aims to define the favourable conservation condition of a habitat or species at site level. The maintenance of habitats and species within sites at favourable condition will contribute to the maintenance of favourable conservation status (FCS) of those habitats and species at a national level.

Conservation objectives are defined using attributes and targets that are based on parameters as set out in the Habitats Directive for defining favourable status, namely area, range, and structure and functions.

The *Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland* (Perrin *et al.*, 2014) have been used as a basis for setting most of the site-specific attributes and targets for uplands habitats, and those upland habitats that also occur in lowland areas. However, attributes and targets may change/become more refined as further information becomes available.

As no recent detailed survey has been undertaken to assess the area or the structure and functions of the Qualifying Interest habitats in Carrowmore Lake Complex SAC, the National Conservation Assessment (NCA) for each Annex I habitat (NPWS, 2013) was instead utilised to indicate condition of the habitats in the SAC. If area and structure and functions were both assessed as “Favourable”, the objective for that habitat is to maintain favourable conservation condition. If either parameter

was assessed as “Unfavourable – Inadequate” or “Unfavourable – Bad”, the objective for that habitat is to restore favourable conservation condition. The NCA for 7130 Blanket bogs (* if active bog) was Unfavourable – Bad for both area and structure and functions. The NCA for 7150 Rhynchosporion depressions was Unfavourable – Inadequate for both area and structure and functions.

This document provides supporting information for the attributes of the conservation objectives for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions given in the main conservation objectives document for Carrowmore Lake Complex SAC. The two documents should be read in conjunction with each other.

The conservation objective for each of the Annex I habitats dealt with in this supporting document are as follows:

- To restore the favourable conservation condition of Blanket bogs (* if active bog) in Carrowmore Lake Complex SAC.
- To restore the favourable conservation condition of Depressions on peat substrates of the Rhynchosporion in Carrowmore Lake Complex SAC.

3 Area

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is for the habitat area to be stable or increasing. Approximate baseline figures are presented in Table 2 for 7130 Blanket bogs (* if active bog) in Carrowmore Lake Complex SAC. There were no data with which to estimate the approximate area of 7150 Rhynchosporion depressions in the SAC.

Table 2: Estimated extent of Annex I habitats that are listed as Qualifying Interests for Carrowmore Lake Complex SAC. *denotes priority habitat.

Annex I code	Habitat	Approximate area (ha)	% of SAC
7130	Blanket bogs (* if active bog)	2,285	63
7150	Rhynchosporion depressions	Unknown	Unknown

As mentioned earlier, the area of habitat 7130 comprises active and inactive blanket bogs. The most frequent example of the latter encountered in the NSUH is described in Perrin *et al.* (2014) as a monospecific sward of common cottongrass (*Eriophorum angustifolium*) on eroded bog where a reasonable depth of peat remains. Note, however, that where examples of this community occur on re-deposited, eroded peat, these areas will not have the structural, hydrological or functional characteristics of naturally formed blanket bog.

4 Range

Each habitat’s range at site level, in the form of habitat distribution, has not been recorded in detail as no comprehensive mapping of the SAC has been recently undertaken. However, it is documented that 7130 Blanket bogs (* if active bog) lie east of Carrowmore Lake at Glenturk, Carrowmore (or Glencullin) and Largan More (Foss & McGee, 1987; Douglas *et al.*, 1989; NPWS internal files). 7150 Rhynchosporion depressions are scattered throughout the blanket bog in the SAC. They are best developed in areas of deep, quaking peat and around pools (Douglas *et al.*, 1989; NPWS internal files). The target is that there should be no decline.

5 Structure and functions

Structure and functions relates to the physical components of a habitat (“structure”) and the ecological processes that drive it (“functions”). For blanket bogs and associated habitats, these include a range of aspects such as soil chemistry, vegetation composition, hydrological regime, community diversity, habitat quality, species occurrence, indicators of local distinctiveness, disturbed ground, evidence of burning and negative species occurrence. These structure and functions are expanded on in the sections below.

At Carrowmore Lake Complex SAC, the structure and functions of 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions have not been assessed in the field as there has been no recent detailed habitat survey.

5.1 Ecosystem function

Ecosystem function is assessed primarily through consideration of soil nutrient levels. For 7130 Blanket bogs (* if active bog), additional consideration is given to peat formation and hydrology.

5.1.1 Ecosystem function: soil nutrients

An attribute to assess soil nutrients is common to each of the habitats with a view to maintain the soil nutrient status within the natural range suited to the habitat. Relevant nutrients and natural ranges have yet to be defined. Nitrogen deposition and associated acidification are noted as being relevant to blanket bogs and associated habitats in NPWS (2013). The target for both habitats is to maintain the soil nutrients status within the natural range.

5.1.2 Ecosystem function: peat formation

Ecosystem function of 7130 Blanket bogs (* if active bog) is further assessed through peat formation. Perrin *et al.* (2014) established an overriding assessment of blanket bog structure and functions based on the proportion of degraded bog within a site which includes eroding bog and cutover bog which would previously have been this Annex I habitat. If more than 1% of the combined area of active bog (Annex I habitat 7130*), inactive bog (Annex I habitat 7130), eroded bog (habitat category PB5 – Fossitt, 2000) and recently cutover bog (habitat PB4 – Fossitt, 2000) is inactive, eroded or cutover then it should be assessed as Unfavourable – Inadequate, even if the results of the monitoring stops data are more positive. If more than 5% of the combined area is inactive, eroded or cutover it is assessed as Unfavourable – Bad.

The EU habitats interpretation manual (European Commission, 2013) defines active blanket bog as “still supporting a significant area of vegetation that is normally peat-forming”. For the purposes of defining favourable conservation condition of the Annex I habitat, the target is that at least 99% of the total Annex I blanket bog area is active bog.

5.1.3 Ecosystem function: hydrology

Ecosystem function of 7130 Blanket bogs (* if active bog) is further assessed through assessment of hydrology. Drains (cut for purposes of peat cutting, afforestation, etc.) and erosion gullies impact on

the hydrology of blanket bog in the local vicinity. The target is for the natural hydrology to be unaffected by drains and erosion gullies.

5.2 Community diversity

A variety of blanket bog vegetation communities have been recorded in this SAC (Foss & McGee, 1987; Douglas *et al.*, 1989; NPWS internal files), four of which correspond to NSUH provisional communities as described in the NSUH manual (Perrin *et al.*, 2014). These comprise BB1 *Schoenus nigricans* – *Eriophorum angustifolium* bog, BB4 *Trichophorum germanicum* – *Eriophorum angustifolium* bog, BB5 *Calluna vulgaris* – *Eriophorum* spp. bog and BB7 *Eriophorum angustifolium* – *Sphagnum austinii* bog.

The target for the SAC is to maintain the variety of vegetation communities within 7130 Blanket bogs (* if active bog). 7150 Rhynchosporion depressions are defined by just one provisional vegetation community; therefore, the community diversity attribute does not apply to this habitat.

5.3 Vegetation composition

Vegetation composition is assessed through a range of attributes tailored to each of the habitats. In general terms, they establish minimum thresholds for the occurrence or cover of desirable species and maximum thresholds for undesirable species.

5.3.1 Vegetation composition: positive indicator species

The attribute for positive indicator species is common to each of the blanket bogs and associated Annex I habitats, and habitat-specific lists of the positive indicator species are presented in the NSUH manual (Perrin *et al.*, 2014). A positive species criterion is set to ensure that vegetation remains representative of the habitat and is not degrading or succeeding to a different habitat. The target by which this attribute is measured varies between habitats. Descriptions of these habitats can be found in the NSUH manual (Perrin *et al.*, 2014).

For some habitats, a certain number of positive indicator species is required. At least seven positive indicator species are required at each monitoring stop for 7130 Blanket bogs (* if active bog) and at least five are required for 7150 Rhynchosporion depressions.

5.3.2 Vegetation composition: other desirable species

Other elements of vegetation composition which can collectively be regarded as being desirable are also established with a range of habitat-specific targets set.

Lichens and bryophytes

Minimum thresholds for cover of lichens and bryophytes are set for habitats where a plentiful lichen/moss layer is characteristic, such as 7130 Blanket bogs (* if active bog). Within the habitat-specific targets for these attributes, the specific species, or groups of species which are required, are listed together with any exclusions e.g. *Sphagnum fallax* can be indicative of degraded bog so is excluded from the 7130 Blanket bogs (* if active bog) assessment.

Rhynchospora species

A relatively plentiful cover of *Rhynchospora* species is characteristic of 7150 Rhynchosporion depressions. The target is for at least 10% cover of these species at each monitoring stop.

5.3.3 Vegetation composition: negative indicator species

A percentage cover threshold for negative indicator species has been established for blanket bog and associated habitats, including those listed as Qualifying Interests for Carrowmore Lake Complex SAC. Habitat-specific negative indicator species lists have been established for each of the habitats and are presented in Perrin *et al.* (2014). Presence of these species would likely indicate undesirable impacts of management such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. The percentage threshold is generally set quite low such that impacts can be reversed before they become more severe.

5.3.4 Vegetation composition: non-native species

An attribute for non-native species is common to 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions. Non-native species can be invasive and have deleterious effects on native vegetation. The target for both habitats is for the total cover of non-native species to be less than 1%. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances.

5.3.5 Vegetation composition: undesirable native species

For both Qualifying Interest habitats present in Carrowmore Lake Complex SAC, maximum percentage cover thresholds for undesirable native species are also set. These are detailed below.

Native trees and shrubs

Tree and shrub cover is assessed for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions. High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to the habitat drying out.

Potential dominant species

For 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions, a maximum threshold is given for bog species which could potentially dominate the habitat, reflecting a reduction in diversity. The selected species for 7130 Blanket bogs (* if active bog) are ling (*Calluna vulgaris*), many-stalked spike-rush (*Eleocharis multicaulis*), hare's-tail cottongrass (*Eriophorum vaginatum*), purple moor-grass (*Molinia caerulea*), black bog-rush (*Schoenus nigricans*) and deergrass (*Trichophorum germanicum*). The target for 7130 Blanket bog (* if active bog) is for cover of each of the potential dominant species to be less than 75%. For 7150 Rhynchosporion depressions, the potentially dominant species are many-stalked spike-rush (*Eleocharis multicaulis*), purple moor-grass (*Molinia caerulea*), black bog-rush (*Schoenus nigricans*) and deergrass (*Trichophorum germanicum*). For 7150 Rhynchosporion depressions, the cover of each of the potential dominant species should be less than 35%.

5.4 Vegetation structure

Vegetation structure is assessed through a number of attributes tailored to each of the habitats. These measures assess levels of browsing, burning and *Sphagnum* condition.

5.4.1 Browsing

Browsing is generally measured through viewing the last complete season's shoots of particular species and assessing the proportion which shows signs of having been browsed. The species which are assessed for browsing are generally the dwarf shrub species: ericoids, crowberry (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*). The target for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions is for less than 33% of shoots to show signs of browsing.

5.4.2 Burning

Fires can be part of the natural cycle of heaths and may, under carefully controlled circumstances, be used as an occasional management tool to promote regeneration of, or diversity of growth phases, in ling (*Calluna vulgaris*). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires that are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to habitats. An assessment of burning is made for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions. Habitat-specific lists of sensitive areas where burning should not occur are presented in Perrin *et al.* (2014).

7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions have the same targets relating to there being no signs of burning into the moss, liverwort or lichen layer or exposure of peat surface due to burning and no signs of burning in sensitive areas.

5.4.3 Sphagnum condition

Disturbance to *Sphagnum* is assessed for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions. High levels of disturbed *Sphagnum* would indicate undesirable levels of grazers. For both habitats, the target is for less than 10% of the *Sphagnum* cover to be crushed, broken and/or pulled up.

5.5 Physical structure

The physical structure of the habitats can be damaged by drainage, walking trails, unsuitable levels of grazing and erosion. Physical structure is assessed through a number of attributes tailored to each of the habitats. Elements which are assessed for the habitats comprise disturbed bare ground, drainage and erosion; these are detailed below.

5.5.1 Disturbed bare ground

This attribute is common to both habitats listed as Qualifying Interests for Carrowmore Lake Complex SAC. Disturbance can include hoof marks, wallows, human foot prints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands. The target for both habitats is set at there being less than 10% disturbed ground.

5.5.2 Drainage

Drainage can result in loss of characteristic species and transition to drier habitats. For both 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions, the target is the area showing signs of drainage from heavy trampling, tracking or ditches to be less than 10%.

5.5.3 Erosion

Erosion is assessed for 7130 Blanket bogs (* if active bog) and 7150 Rhynchosporion depressions. Erosion leads to loss of peat from the blanket bog system, increases in peat sediment in nearby water courses, loss of blanket bog habitat and drainage. The target for both habitats is that less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas. The greater bog mosaic incorporates the blanket bog itself and associated vegetation types and non-vegetation cover types that appear to have been derived from former blanket bog, including, but not limited to, bare peat, loose rock, gravel and running water.

5.6 Indicators of local distinctiveness

Rare species (those considered at least *Near Threatened* on the appropriate Red Data List) which can be assigned to a particular habitat should be considered indicators of local distinctiveness for the habitat. The target is for no decline in distribution or population sizes of rare, threatened or scarce species associated with the particular habitat.

The EU Habitats Directive Annex II and Flora (Protection) Order, 2015 (FPO; Statutory Instrument No. 356 of 2015) listed and *Near Threatened* (Lockhart *et al.*, 2012) slender green feather-moss (*Hamatocaulis (Drepanocladus) vernicosus*) occurs within flushes associated with the 7130 Blanket bogs (* if active bog) habitat in the SAC, although not specifically within the habitat itself (Campbell *et al.*, 2015). This species is a Qualifying Interest for Carrowmore Lake Complex SAC.

The Annex II and Annex IV listed, FPO listed and *Near Threatened* marsh saxifrage (*Saxifraga hirculus*) (Wyse Jackson *et al.*, 2016) also occurs within the same/similar flushes associated with 7130 Blanket bogs (* if active bog) in the SAC (Muldoon *et al.*, 2015). Marsh saxifrage is also a Qualifying Interest species for Carrowmore Lake Complex SAC.

Where hepatic mats of the *Calluna vulgaris-Herbertus aduncus* community have been recorded within a particular habitat these should also be listed as indicators of local distinctiveness. No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron & Perrin (2014). The target for these hepatic mats is for no decline in status of hepatic mats associated with the habitat in question.

6 References

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