European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

Crowdy Marsh Special Area of Conservation (SAC)
Site code: UK0030329

Cover photograph: Crowdy Marsh (M. Angus, SWW, 2017)

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Crowdy Marsh SAC. This advice should therefore be read together with the SAC Conservation Objectives available here.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Crowdy Marsh Special Area of Conservation (SAC)
Location	Cornwall
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	*92.65 ha*
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Bodmin Moor North SSSI
Relationship with other European or International Site designations	N/A

Site background and geography

Crowdy Marsh is one of several valley mires found around the edge of the granite massif of Bodmin Moor, and is included within Bodmin Moor North SSSI. Most of the gently-sloping wide valley is now occupied by a freshwater reservoir, and Crowdy Marsh is all that is left of the once more extensive valley mire system at the eastern end of the reservoir. It supports valuable transition mire habitat, comprising a range of mire and valley bog communities. Throughout the Moor a number of such areas have been flooded by reservoir construction, though at Crowdy Marsh a high degree of biological interest remains because of the gradual transition to peatland with a complex of islets and emergent vegetation.

Rare or local flowering plants occurring within the bog communities include bog pimpernel *Anagallis tenella*, oblong-leaved and round-leaved sundew *Drosera intermedia* and *D. rotundifolia*, bog orchid *Hammarbya paludosa*, bogbean *Menyanthes trifoliata*, pale butterwort *Pinguicula lusitanica*, lesser skullcap *Scutellaria minor* and ivy-leaved bellflower *Wahlenbergia hederacea*.

Crowdy Marsh SAC is part of National Character Area (NCA) Profile: 153 Bodmin Moor (NE415).

Part of the site is common land and part is privately owned.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H7140 Transition mires and quaking bogs**

The term 'transition mire' relates to vegetation that in floristic composition and general ecological characteristics is transitional between acid bog and alkaline fens, in which the surface conditions range from markedly acidic to slightly base-rich.

The transition mire at Crowdy includes the water tracks and occasional waterlogged hollows found throughout marsh. The deep hollows are dominated by bog-mosses (*Sphagnum* species) with a mix of typical transition mire species such as bogbean Me*nyanthes trifoliata*. Marsh St John's-wort *Hypericum elodes* and bog pondweed *Potamogeton polygonifolius* are common in the water tracks, often fringed by the rushes *Juncus effusus* and *Juncus bulbosus*.

The gently-sloping wide valley of Crowdy Marsh SAC is now occupied by a freshwater reservoir, but feeder streams still meander via a network of water tracks between low peaty mounds over the remainder. The H7140 Transition mire includes the water tracks and occasional waterlogged hollows found throughout Crowdy Marsh.

Qualifying Species:

N/A

Table 1: Supplementary Advice for Qualifying Features: H7140. Transition mires and quaking bogs; Very wet mires often identified by an unstable `quaking` surface

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	**Extent of the feature within the site**	Maintain the total extent of the H7140 feature to 32.39ha. .	There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.	This attribute will be periodically monitored as part of Natural England's site condition assessments. TACP 2016. Bodmin Moor North survey. Report to Natural England.
Extent and distribution of the feature	**Spatial distribution of the feature within the site**	Restore the distribution and configuration of the feature, including where applicable its component vegetation types, across the site	Distribution includes the spatial pattern or arrangement of this habitat feature, and its component vegetation types, across the site. Changes in distribution may affect the nature and range of the vegetation communities present, the operation of the physical, chemical, and biological processes in the system and the resiliency of the site and its features to changes or impacts. A "restore" target is appropriate here because the most recent habitat survey (TACP) noted that some areas were dominated by *Molinia*.	TACP 2016. Bodmin Moor North survey. Report to Natural England.
Structure and function	**Vegetation community**	Ensure the component vegetation communities of the	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting	Exmore Mires Partnership. 2017. *Crowdy Marsh*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(including its typical species)	**composition**	feature are referable to and characterised by the following National Vegetation Classification types: M4 - *Carex rostrata - Sphagnum recurvum* (fallax) mire M6 - Carex echinata - *Sphagnum recurvum (fallax) /auriculatum (denticulatum)* M21 - *Narthecium ossifragum - Sphagnum papillosum* mire M29 *Hypericum elodes – Potamogeton polygonifolius* soakway, with transition zones comprising M25 - *Molinia caerulea - Potentilla erecta* mire, M15 - *Scirpus cespitosus - Erica tetralix* wet heath and M16 - *Erica tetralix - Sphagnum compactum* wet heath,	the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature.	*Baseline Vegetation monitoring*. Project report, and part of SWLT management plan. TACP 2016. *Bodmin Moor North survey.* Report to Natural England. Leppitt. P. 2015. *Bodmin Moor North SSSI survey*, Report to Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	**Key structural, influential and/ or distinctive species**	Restore] the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature. an assemblage of Sphagnum species (including *S. nitens and S. auriculatum*), Bottle sedge *Carex rostrata* Star sedge *Carex echinata* Marsh cinquefoil *Potentilla palustris* Bog asphodel *Narthecium ossifragum.*	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; • **Structural** species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • **Influential** species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role	Exmoor Mires Partnership 2017. *Crowdy Marsh Baseline Vegetation monitoring*. Project report, and part of SWLT management plan TACP 2016. *Bodmin Moor North survey.* Report to Natural England. Leppitt. P. 2015. *Bodmin Moor North SSSI survey*, Report to Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			linked to the habitat) • **Site-distinctive** species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available. A "restore" target is considered appropriate here as the part of Crowdy Marsh SAC within unit 10 is overgrazed which is likely to have affected the abundance of its typical species as a result, while other areas are over dominated by *Molinia*. Rare or local flowering plants occurring within the bog communities including: Bog pimpernel *Anagallis tenella*, Oblong-leaved sundew *Drosera intermedia,* Round-leaved sundew *D. rotundifolia* Bog orchid *Hammarbya paludosa,* Bogbean *Menyanthes trifoliata* Cranberry *Vaccinium oxycoccus,* Pale butterwort *Pinguicula lusitanica,* Lesser skullcap *Scutellaria minor* and Ivy-leaved bellflower *Wahlenbergia hederacea.*	
Structure and function (including its typical species)	**Invasive, non-native and/or introduced species**	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the feature	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides).	Exmoor Mires Partnership 2017. *Crowdy Marsh Baseline Vegetation monitoring*. Project report, and part of SWLT management plan TACP 2016. *Bodmin Moor North survey.* Report to Natural England. Leppitt. P, 2015. *Bodmin Moor*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				North SSSI survey, Report to Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	**Presence/ cover of woody species**	Maintain a low cover (<10% of the area) of scrub or trees within stands of H7140,	Native trees and shrubs occur naturally on bog and fen surfaces but an abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because they are indicators and perpetrators of drying out and may cause damage to vegetation structure through shading effects. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces.	TACP 2016. *Bodmin Moor North survey.* Report to Natural England. Leppitt. P. 2015. *Bodmin Moor North SSSI survey*, Report to Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	**Exposed substrate**	Restore] a low cover of exposed substrate of between 5% & 10% across feature.	For this wetland habitat type, maintaining some continuous extent of exposed, open ground surface is required to support the establishment and supply of those component species which often rely on wet and sparsely-vegetated conditions. A "restore" target is considered appropriate here as the part of Crowdy Marsh SAC within unit 10 is overgrazed and heavily poached in some areas.	TACP 2016. *Bodmin Moor North survey.* Report to Natural England. Leppitt. P. 2015. *Bodmin Moor North SSSI survey*, Report to Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments.
Structure and function (including its typical species)	**Hydrology**	At a site, unit and/or catchment level (as necessary), restore natural hydrological processes to provide the conditions necessary to sustain the feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This	Natural England. 2014. *Crowdy Marsh SAC Site Improvement Plan*.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. Wheeler et al. (2009) provide range and mean for summer & winter water levels for those wetland NVC types constituting Annex 1 habitats. This provides a rough guide to appropriate levels, but it is critical that individual sites and their needs are considered as there is considerable variation within the NVC communities listed and recorded water levels. A "restore" target is considered appropriate here because the hydrology of the site is likely to be affected by the presence of ditches within and adjacent to the site (some of which have recently been blocked under a restoration project implemented by South West Water), the adjacent conifer plantation and the adjacent reservoir, particularly during periods of drawdown.	Wheeler, BD, Shaw, SC, and Tanner, KA. 2009. *Wetland Framework for Impact Assessment at Statutory Sites*. EA Science report. McBride *et al* 2011. Fen Management Handbook
Structure and function (including its typical species)	**Water chemistry**	Maintain the surface water and groundwater supporting the hydrology of the bog at a low nutrient status.	UKTAG (2012) provides threshold values for nitrate concentration in groundwaters for different wetland types. The threshold values will mainly be used in the characterisation of GWDTE status for the WFD, primarily as a risk screening tool, to assess if sites are 'at risk' or 'not at risk' from groundwater mediated nutrient pressure. Due to the complex cycling of nutrients within many GWDTE, these threshold values are less well suited for application within sites but rather just to groundwater that is directly feeding the site. The water chemistry of the bog has not been investigated but the site is not currently thought to be at risk from groundwater nutrient pressure, due to the surrounding landuse (which is largely unimproved moorland).	UKTAG. 2012. Technical report on groundwater dependent terrestrial ecosystem (GWDTE) threshold values. http://www.wfduk.org/resources%20/groundwater-dependent-terrestrial-ecosystem-threshold-values
Structure and function (including its typical species)	**Hydrology**	Restore a high piezometric head and permanently high water table (allowing for natural seasonal fluctuations) on groundwater dependent sites.	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations	Natural England. 2014. *Crowdy Marsh SAC Site Improvement Plan*.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			may be required to fully inform conservation measures and/or the likelihood of impacts. Some examples of H7140 may be wholly or partly groundwater dependent. Others have a greater dependence on surface water or rain water inputs. It is critically important to understand the ecohydrological context of all sites. Further site investigations are required to inform conservation measures but a restore target is appropriate here because the hydrology of the site is likely to be affected by the presence of ditches within and adjacent to the site (some of which have recently been blocked under a restoration project implemented by South West Water), the adjacent conifer plantation and the adjacent reservoir, particularly during periods of drawdown.	
Structure and function (including its typical species)	**Adaptation and resilience**	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The over vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being high, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that for this site is considered to be the most vulnerable sites overall and are likely to require the most adaptation action, most urgently. A site based assessment	Natural England. 2015. *Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs* [both available at http://publications.naturalengland.org.uk/publication/4954594591375360.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			should be carried out as a priority. This means that action to address specific issues is likely, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable. A “restore” target is considered appropriate here because of the need to restore the natural hydrology of the site to improve its resilience.	
Structure and function (including its typical species)	**Supporting off-site habitat**	Restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature [particularly the deep peat dominated areas currently under conifer].	The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species. This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment. A “restore” target is considered appropriate here because of probable impacts of the adjacent conifer plantation on the hydrology of the site.	
Supporting processes (on which the feature relies)	**Air quality**	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and	More information about site-relevant Critical Loads and Levels for this SAC is available by using the ‘search by site’ tool on the Air Pollution Information System.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. A "restore" target is considered appropriate here because the nitrogen and acidity critical loads are currently exceeded (see the Air Pollution Information System).	
Supporting processes (on which the feature relies	**Conservation measures**	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to restore the structure, functions and supporting processes associated with the feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. This habitat in most cases requires ongoing cutting or grazing maintain its open character. Parts of the site (within Davidstow common) are currently overgrazed; outside the common the habitat requires ongoing cattle grazing to control the dominance of *Molinia*.	Natural England. 2014. *Crowdy Marsh SAC Site Improvement Plan.* English Nature, 2005. *Views about the management of Bodmin Moor North SSSI*. Available at https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1002227.pdf English Nature. 2005. *Bodmin Moor, North: Views about Management* This attribute will be periodically monitored as part of Natural England's site condition assessments.
Version Control				

Attributes	Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
N/A			
Variations from national feature-framework of integrity-guidance: N/A			