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

Leighton Moss
Special Protection Area (SPA)
Site Code: UK9005091

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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Leighton Moss SPA. This advice should therefore be read together with the SPA 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	Leighton Moss Special Protection Area (SPA)
Location	Lancashire
Site Map	The designated boundary of this site can be viewed here on the MAGiC website
Designation Date	30 January 1996
Qualifying Features	See section below
Designation Area	124.9ha
Designation Changes	N/A
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)	Leighton Moss SSSI
Relationship with other European or International Site designations	N/A

Site background and geography

Leighton Moss SPA is situated on the north-west coast of Lancashire within the Morecambe Bay Limestone National Character Area (NCA Profile 020) and lies adjacent to Morecambe Bay. Leighton Moss holds the largest area of reed-bed in northern England.

The Leighton Moss reserve is located on the site of a former raised mire drained for agricultural purposes and has since been allowed to flood and develop as a reedbed providing habitat for species at the north western limit of their British range such as bittern and bearded tit.

About the qualifying features of the SPA

The following section gives you additional, site-specific information about this SPA's qualifying features. These are the individual species of wild birds listed on Annex I of the European Wild Birds Directive, and/or the individual regularly-occurring migratory species, and/or the assemblages (groups of different species occurring together) of wild birds for which the SPA was classified for.

Qualifying individual species listed in Annex I of the Wild Birds Directive

During the breeding season the SPA regularly supports:

- **A021 Bittern *Botaurus stellaris*** (Breeding)

At the time of its classification, the SPA supported 4 breeding pairs of bittern, which represented approximately 20% of the British breeding population.

The bittern is a shy species, favouring wetlands dominated by common reed (*Phragmites australis*). Bitterns feed on fish and amphibians, which they get from within the reedbed or within the reeds' edge and rarely venture out into the open.

At one time Bitterns were a locally numerous breeding species in the UK, but became extinct by the 1880s as wetlands were drained for agricultural purposes and the remaining birds were persecuted by egg and skin collectors and by 'sportsmen'. Breeding was established again in the UK in 1911 and the population grew to an estimated peak of 78-83 booming males in the mid-1950s (Day & Wilson 1978). The increase was almost certainly a result of legislative protection, the protection of existing reedbeds as nature reserves, and the flooding of coastal areas as war-time defence against invasion, with the coincident growth of extensive stands of reed. As these reedbeds matured, they accumulated reed-litter and dried out, pools and dykes became choked with reed growth and became unsuitable for Bitterns.

Numbers have also been adversely affected by changes to food supply, a lowering of water tables due to high levels of ground water abstraction, and local pollution. As a result of these negative factors, numbers have fallen steadily, reaching what was probably their lowest point in 1997 of an estimated 11-12 'booming' males.

A programme of targeted creation, restoration and management of reedbeds over the last 20 years has seen a significant increase in the breeding population of Bitterns within England, with at least 164 "booming" males recorded in 2017.

Small numbers of bitterns have bred at Leighton Moss regularly until 2009; a decline in the suitability of the reedbed for this species is thought to be responsible for the lack of breeding for the next 9 years. A programme of habitat management has improved the condition of the reedbed and confirmed breeding was recorded in 2018.

Qualifying individual species not listed in Annex I of the Wild Birds Directive

N/A

Qualifying assemblage of species

N/A

Site-specific seasonality of SPA features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SPA during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SPA outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying bird features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required. Non-breeding water bird monthly maxima data gathered for this site through the Wetland Bird Survey ('WeBS') may be available upon request from the British Trust for Ornithology.

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Bittern	Breeding	Spring / Summer													

Guide to terms:
Breeding – present on a site during the normal breeding period for that species
Non-breeding - present on a site outside of the normal breeding period for that species (includes passage and winter periods).
Summer – the period generally from April to July inclusive
Passage - the periods during the autumn and spring when migratory birds are moving between breeding areas and wintering areas. These periods are not strictly defined but generally include the months of July – October inclusive (autumn passage) and March – April inclusive (spring passage).
Winter - the period generally from November to February inclusive.

Table 1: Supplementary Advice for Qualifying Features: A021. *Botaurus stellaris*; Great bittern (Breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Breeding population (within the SPA)	**Population abundance**	Restore the size of the breeding Bittern population to a level which is above 4 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will sustain the site's population and ensures it contributes to a viable local, national and bio-geographic population. Due to the mobility of birds and the dynamic nature of population change, the target-value given for the abundance of this feature is considered to be the minimum standard for conservation/ restoration measures to achieve. This minimum-value may be revised where there is evidence to show that a population's size has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period. The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current abundance of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account. Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured/estimated to inform judgements of likely impacts on	Natural England (2017) Definition of Favourable Condition – Leighton Moss SSSI (Final). Document may be available from Natural England upon request

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			abundance targets. Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available. The SPA baseline of 4 pairs of Bittern was chosen as the SSSI target for this species. The figure of 12 pairs from the SSSI / SPA citation is now generally accepted as being incorrect. The records were based on RSPB's monitoring records from 1978-82 where booming males were most likely counted more than once in different locations. The monitoring process has since been refined and the average number of booming males from 1990-96 was four. Breeding did not occur between 2009 and 2017; following a programme of habitat improvement one pair was confirmed breeding in 2018.	
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting breeding habitat**	Restore the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding)	Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. Leighton Moss is functionally linked to other wetland sites within the Arnside and Silverdale AONB that can also help sustain the population of bittern. RSPB have created two new substantial reedbed sites within a mile of Leighton Moss (Barrow Scout and Silverdale Moss) that have supported feeding bittern, Nearby Gait Barrows NNR also has a reedbed and lake where bittern have been recorded recently. RSPB are also creating a new wetland complex locally (Warton Mires) that will also provide feeding habitat for bittern once established. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. This target will apply to any supporting habitat which is known to occur outside the site	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			boundary.	
Supporting habitat (within the SPA): function/ supporting process	**Air quality**	Maintain 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).	The structure and function of the habitats which support this SPA feature may be sensitive to changes in air quality. Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. 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. 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.	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	Maintain the safe passage of Bitterns moving between nesting, roosting and feeding areas	The ability of the feature to safely and successfully move to and from nesting, feeding and roosting areas is critical to their breeding success and to the adult fitness and survival. This target will apply within the site boundary and where birds regularly move to and from off-site habitat where this is relevant.	
Supporting habitat (both within and outside the SPA):	**Conservation measures**	Restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target.	RSPB Management Plan 2016 – 2021 http://ec.europa.eu/environment/nature/natura2000/management/g

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function/ supporting process		and/or the supporting processes associated with the feature and its supporting habitats.	Further details about the necessary conservation measures for this site can be provided by 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. Management required to benefit the population of breeding bittern may include: • Digging out parts of the reedbed to establish early successional reedbed • Establishment of a more natural water regime over parts of the reedbed, including water levels below bed level to allow oxidisation of ground surface • Rotational cutting of reedbed in winter • Rotational ditch clearance and removal of silt to maintain open water features • Removal of invasive scrub • Introduction of deer management to reduce impact of damage to reedbed through deer movement, browsing and nutrient enrichment	p/wetlands/02case_bitterns.html http://ww2.rspb.org.uk/Images/bringing_reedbeds_to_life_tcm9-385799.pdf
Supporting habitat (both within and outside the SPA): function /supporting process	**Food availability within supporting habitat**	Restore the distribution, abundance and availability of key prey items (e.g.eel, rudd, roach, frogs, toads) at preferred prey sizes (e.g. roach of 6-35 cm).	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population. A suitable coarse fish biomass is considered to be >10 kg of appropriate bittern prey per hectare.	RSPB Management Plan 2016 – 2021
Supporting habitat (within the SPA): function/ supporting	**Salinity**	Restore water salinity at or to <0.5% (or <5ppt (parts per thousand)).	This feature is known to be particularly susceptible to changes in the salinity (concentration of salt) of its shallow brackish/fresh water habitat; Salinity is a major factor determining the distribution and composition of communities of fish, amphibians and aquatic invertebrates such as insects, crustaceans and worms on which this feature feeds.	RSPB Management Plan 2016 – 2021 Leighton Moss Site Improvement Plan (2014) Available from: http://publications.naturalengland.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
process			High levels of salinity may adversely affect fish and invertebrate food for adults and chicks. The principal factors governing the temporal and spatial nature of the salinity regime of coastal sites are the diurnal incursion of the tide and fresh water flow from the river(s). Any activity changing either of these factors can result in a change to the salinity regime. High storm driven tides have pushed salt water into the reserve on four occasions overtopping the railway on one occasion; the last was in February 2002. The possibility of an increase both in the number and severity of such incursions increasing with sea level rise and any increase in frequency of storms is one of the major threats to the reserve in the future. The weak point in the defences is the old private flood bank around Quakers Stang in recent times the Environment Agency have undertaken repairs after it has been breached but they are not currently obliged to as it has not been adopted by them.	org.uk/publication/5406466903113728
Supporting habitat (within and outside the SPA): function/ supporting process	**Water area**	Maintain the number of open waterbodies of optimal size (>0.5 ha), and the percentage cover of pools overall, with shallow water extending at least 30 m landward into surrounding dense vegetation.	This feature depends on the presence and continuity of open water habitat; often requiring water bodies of a particular size to in order to successfully nest, rear their young, feed and/or roost. Changes in water area, and associated marginal habitat, can adversely affect the suitability of supporting open water habitat.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water depth**	Maintain the overall depth of swamp and marginal water which is typically between 30–100cm, and/or within pools and dykes at typically 200-400 cm deep.	This feature is known to require extensive areas of water in which to feed. Birds are visual predators, with some having the ability to dive or to feed from the surface. As they will rely on detecting their prey within the water to hunt, the depth of water at critical times of year may be paramount for successful feeding and therefore their fitness and survival. Deep water surrounding nesting sites may also be important to deterring predators.	
Supporting habitat (both within and outside the SPA):	**Water quality/ quantity**	Where the supporting habitats of the SPA feature are dependent on surface water, restore water quality and quantity to a standard which	For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect	RSPB Management Plan (2016 – 2021) Leighton Moss Site Improvement Plan (2014) Available from:

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function/ supporting process		provides the necessary conditions to support the feature	the availability and suitability of breeding, rearing, feeding and roosting habitats. **Water Quantity:** Improved control of water levels are required. Water levels in summer can be too high, exacerbated by high rainfall events and a constrained outflow. The result is increased 'reed hover', reed die-back and difficulty implementing reed management. The relatively static water levels impact directly on breeding Bittern by decreasing reed quality and vigour, reducing the availability of wet reed for breeding Bittern and limiting access to fish prey. Prolonged wet conditions make reed cutting difficult resulting in a poor mosaic of age structure throughout the reed bed. **Water Quality:** Nutrient enrichment of groundwater from organic fertilisers (manure and slurry), inorganic fertilisers and septic tanks in the Leighton Moss catchment is an issue in the SPA. There are no mains sewers in the catchment. Point source pollution from septic tanks was identified as an issue in the Diffuse Water Pollution Plan. Water quality monitoring undertaken by RSPB at Leighton Moss shows elevated nutrient status (especially phosphate). Diffuse pollution from farming activities is identified as a major concern in the Diffuse Water Pollution Plan for the site. Phosphate levels should be less than 10 µg/l TP	http://publications.naturalengland.org.uk/publication/5406466903113728 Leighton Moss Diffuse Water Pollution Plan. Document May be available from Natural England upon request
Supporting habitat (both within and outside the SPA): minimising disturbance	**Minimising disturbance caused by human activity**	Reduce the frequency, duration and/or intensity of disturbance affecting nesting, roosting, foraging, feeding, moulting and/or loafing birds so that the Bittern feature is not significantly disturbed	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and the presence of people, animals and structures.	
Supporting habitat (within the SPA): predation	**Predation**	Reduce the predation and disturbance of Bittern caused by native and non-native predators.	This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.	
Supporting habitat (within the SPA): structure	**Landform**	Maintain the extent of wet ditches and/or pools with suitable profiles (typically, with a deep central channel of 1.5-2.5 m deep and one or more 1 m deep with 5 m wide shallow margins).	The physical topography and landform of a site will strongly influence the quality and extent of supporting habitats used by this feature for nesting/rearing, feeding and/or roosting as appropriate. This will also influence the interactions with underlying supporting processes on which the supporting habitat may rely. Any changes or modifications to site topography may adversely affect the ability of the supporting habitats to support and sustain this feature.	
Supporting habitat (both within and outside the SPA): structure	**Landscape**	Maintain an open and unobstructed terrain which provides safe passage for birds moving between breeding, roosting and feeding areas across the site.	This feature is known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or roosting habitat to detect approaching predators, or to ensure visibility of displaying behaviour. An open landscape may also be required to facilitate movement of birds between the SPA and any off-site	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			supporting habitat.	
Supporting habitat (within the SPA): structure	**Vegetation characteristics**	Restore the cover of scrub-free areas of reed-bed with common reed *Phragmites australis* at or above 90% cover and with a diverse age structure (typically at least 30% of the reedbed should be uncut with the remainder <7 years old with <20% cut in any year).	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/ rearing/ feeding/ concealment/ roosting. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may adversely affect the feature.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				