



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

**Bowland Fells
Special Protection Area (SPA)
Site Code: UK9005151**



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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Bowland Fells SPA. This advice should therefore be read together with the SPA Conservation Objectives available [here](#).

This advice updates and replaces a previous draft version dated 7 February 2019.

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.

This site is also a potential SPA because Government has previously undertaken a public consultation on the scientific case for the classification of breeding lesser black-backed gull as an additional qualifying feature of this SPA. Should this feature be formally added to the SPA in the future, this document will be amended to include additional draft supplementary advice about the breeding lesser black-backed gull feature.

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	Bowland Fells Special Protection Area (SPA)
Location	Lancashire
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	1993
Qualifying Features	See section below
Designation Area	16007.83 ha
Designation Changes	
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)	Bowland Fells SSSI
Relationship with other European or International Site designations	n/a

Site background and geography

The Bowland Fells SPA is contiguous with the Bowland Fells SSSI. It is an outlier of the Pennine Range encompassing the main upland block within the area of Lancashire known as the Forest of Bowland. The large-scale sweeping landscape of the area characterises the [Bowland Fells National Character Area](#) (NCA) within which the majority of the SPA sits with small areas in the [Bowland Fringe and Pendle Hill NCA](#). It lies entirely within the [Forest of Bowland Area of Outstanding Natural Beauty](#) (AONB).

The rock underlying Bowland Fells is Millstone Grit beneath which lies Carboniferous Limestone. These resistant rocks rise sharply as fell-top plateaus mostly over 250 m dissected by stream and river valleys where there are weaker mudstones. The flatter tops and shallow slopes are overlain by deep peat soils with occasional gritstone outcrops, such as the highest point Ward's Stone at 561 m. Bowland Fells receive high amounts rainfall and storage of this water in wet peat soils is important to regulate both drinking water supply and flood impacts in the catchments of main rivers which are fed from the site - the Wyre, Lune and Ribble. These wet organic soils also store large volumes of carbon.

The extensive upland fells support the largest expanse of heather moorland in Lancashire. Dry upland heath dominated by heather and bilberry is found on the steeper slopes and valleys, while the extensive peat soils are characterised by blanket bog vegetation with *Sphagnum* moss, cotton-grasses and heather and including rare plants such as bog rosemary. These provide habitat for a diverse upland breeding bird community, most notably scarce birds of prey such as hen harrier, merlin and peregrine, wading birds such as curlew and small upland passerine birds such as wheatear and ring ouzel. Areas of acid oak and birch woodland are also present in some areas, notably on the northern side of the Fells, where they are important for their rich assemblage of mosses, and birds such as pied flycatcher. The Fells also support one of England's largest breeding colonies of lesser black-backed gulls.

Bowland Fells SPA is grazed as an element of local upland sheep farming systems and many are also managed as driven grouse shoots. In recent decades, conservation management priorities have focussed on reducing the effects of historic overgrazing and on the recovery of dry and eroding peat soils. There has also been extensive areas of native woodland planting in river valleys to create a more diverse landscape and to help improve water quality at source.

The expansive views and tranquillity of the Bowland Fells makes them a popular destination for walkers along the network of rights of way and open access land.

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:

- **A082 Hen harrier *Circus cyaneus***

Hen harriers use the Bowland Fells SPA during the breeding season. The Bowland Fells SPA was designated in 1993 for holding an average (mean) of at least 12 pairs of breeding hen harriers which at that time represented 2.4% of the breeding population in Great Britain.

Hen harrier breeding numbers fluctuate year to year. Between 2002 and 2017, 117 nests were recorded in the SPA representing 62.6% of all nests in England during this period. This statistic demonstrates the importance of the Bowland Fells to the population in England.

Hen harriers are ground-nesting birds and the availability for nesting of tall heather in remote and undisturbed areas is an important feature of the SPA. Hen harriers also benefit from the mosaic of habitats present within the SPA including upland bog, heathland and grassland to supply small bird and mammal prey. Hen harriers can fly up to 60km in a day to forage and maintaining rough grassland and moorland areas both within and outside of the SPA will help to maintain a sufficient food supply throughout their home range.

The latest count (2018) of hen harriers within the SPA is 3 breeding pairs (information from RSPB). The current five year mean for hen harriers is 1.4 breeding pairs (2014-2018). Illegal persecution continues to thwart efforts to restore the species' former range and numbers across England (Natural England 2008; Murgatroyd *et al.* 2019). Persecution of harriers fledged in Bowland is known to have occurred throughout the range of the bird (both within and outside of the site). Site-based factors may have had an influence on the decline in breeding success since designation, particularly the sensitivity of the hen harrier to human disturbance and loss of some mature heather stands favoured for nesting.

During the winter months the long-held view was that the majority of hen harriers moved to lowland areas, congregating at traditionally-used communal roosts. Historically a large proportion of hen harriers breeding in the English uplands were assumed to move from their breeding areas to low lying coastal areas in Lancashire, Merseyside and Cheshire, as well as the North York Moors (Clarke & Watson 1990).

Some hen harriers can be present year-round using both the SPA and supporting habitat surrounding the SPA for roosting and foraging during the winter months. Recent radio and satellite tracking of Bowland's hen harriers is demonstrating that, for juveniles at least, the majority of birds that survive the non-breeding period, particularly females, remain in the northern uplands of England all winter, before a return to their breeding areas the following spring (Natural England 2008). There are also some important roost sites outside of the SPA within the Forest of Bowland and the nearby Yorkshire Dales, particularly areas of rush-dominated wet pasture and lower-lying moorland and rough grazing.

- **A098 Merlin *Falco columbarius***

Merlin are present on the Bowland Fells SPA during the breeding season. The SPA was designated in 1993 for holding 21 pairs of Merlin which at that time represented 3.2% of the population in Great Britain.

Current evidence points to the SPA holding approximately 8-12 pairs of Merlin (2018 RSPB survey, Waterman Infrastructure & Environment Limited 2017, Bowland Ecology 2016).

Merlin are ground-nesting birds. They favour the open, heather moorland of the SPA which provides them with suitable nesting and feeding sites. Merlin breeding in the UK prefer medium to tall stands of heather to use as cover for their ground nests. Meadow pipit is a key prey species of the merlin and the SPA hold good numbers of this bird (Waterman Infrastructure & Environment Limited 2017 Wilkinson & Douglas 2015).

Reasons for the likely decline in the breeding merlin population within Bowland Fells SPA are currently unclear although Heavisides *et al* 2017 indicated on a moorland site in Scotland that activities in breeding areas such as loss of mature heather stands due to intensification of land management activities as well increased access and infrastructure are likely to be the most important factors.

Evidence from ringing data has shown during the winter months that Merlin will leave the uplands for the lowland areas, including coastal areas and farmland (Dickson 1988). Changes in prey availability in these areas, especially farmland birds, may influence returning breeding populations (Heavisides *et al* 2017). However some Merlin have been shown to be relatively sedentary and will remain close to their breeding sites.

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.

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
<i>Circus cyaneus</i> Hen harrier	Breeding	Summer													
<i>Falco columbarius</i> Merlin	Breeding	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: A082. *Circus cyaneus*; Hen harrier (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 hen harrier population to a level which is consistently above 12 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count	This will sustain the site's population and ensure 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 abundance targets.	Some data is available publicly through RSPB blogs for current population data (2018). Other population data may be available through NE reports and requested from NE. Data beyond pair numbers will be sensitive and restricted due to hen harriers being protected by Schedule 1 of the Wildlife and Countryside Act and under threat from illegal persecution. MURGATROYD <i>et al.</i> 2019.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. At this SPA, the latest 5 year mean (2014-2018) is 1.4 pairs of hen harrier. Evidence shows that illegal persecution of the species across its yearly range is currently preventing the recovery of the population within the SPA and across England. This is likely to be adversely affecting the breeding success, recruitment and juvenile and adult survival of the hen harrier population. The prevention of persecution to restore population abundance is therefore necessary to achieve this objective. Particularly while populations within the SPA and across England remain low, failure on a local scale to achieve any attribute target which prevents successful breeding may have a significant effect on this restoration target	
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function and/or the supporting processes associated with breeding hen harrier and its supporting habitats.	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. 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. The principal measures currently required are the cessation of illegal persecution, the appropriate management of supporting habitats used by breeding hen harriers (including blanket bog, dry and wet upland heath and acid grassland) and the avoidance of disturbance to nesting birds during the breeding season.	NATURAL ENGLAND, 2014. ENGLISH NATURE, 2005.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (within the SPA): predation	Predation	Restrict the predation of and disturbance of breeding hen harriers 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 by predators. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. This is not currently considered to be a factor affecting the hen harrier population at this SPA. Should evidence suggests predator management is required, measures might include their exclusion through fencing 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 (both within and outside the SPA): function/ supporting process	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for the supporting habitat of 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 (NO_x) 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. There is a potential threat to the species due to impacts on the	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).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			species' broad supporting habitat from nitrogen, ammonia, NOx and SO2	
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting breeding habitat	Maintain and restore the extent, distribution and availability of suitable breeding habitat which supports hen harrier for all necessary stages of its breeding cycle (courtship, nesting, feeding): Maintain 2,840 ha of active blanket bog and restore 4,967ha of degraded bog Maintain 3,533 ha and restore 792 ha of dwarf shrub heath	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. 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 boundary, including lowland farmland and coastal areas. At this SPA, supporting habitats include open moorland vegetation comprising a mix of blanket bog, dry upland heath and acid grassland, with occasional stands of bracken. The current balance of habitat (allowing for some dynamic habitat changes away from key breeding locations) to be broadly retained is approximately 50% blanket bog, 25-30% wet and dry heath and the remainder comprising mostly grassland with occasional flushes and some clough woodland	NATURAL ENGLAND, 2012.
Supporting habitat (within the SPA): structure	Vegetation characteristics	Maintain an optimal mix of vegetation to provide sufficient cover for nesting and open, prey-rich areas for hunting.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/rearing/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. Hen harriers typically prefer to nest in stands of undisturbed mature/degenerate heather at least 50cms in height, particularly at altitudes above 350m on slightly sloping ground with a north to north-east aspect (especially in cloughs) and/or in areas which have historically proven to be favourable nesting areas. Stands of tall heather should ideally be present in patches >2 ha in size, with scattered trees particularly in cloughs. For hunting, open areas of heath and bog should be present alongside long and tussock-forming grasslands with wet flushes	NATURAL ENGLAND, 2012.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			interspersed with patches of bracken or low trees/scrub. These open habitats should have varied vegetation heights to provide cover and food (invertebrate/seed) for small mammals and birds which in turn are important prey items.	
Supporting habitat (both within and outside the SPA): minimising disturbance	Minimising disturbance caused by human activity	Restrict the frequency, duration and/or intensity of disturbance affecting nesting, roosting, foraging, feeding, birds so that the hen harrier population 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 contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals and structures.	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain the amount of open and unobstructed terrain, with short vegetation, within areas used for nesting and hunting by breeding hen harrier	This species 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 supporting habitat. Hen Harriers are birds of open landscapes, usually avoiding closed-canopy woodland, conurbations and high mountain tops.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Connectivity with supporting habitats	Maintain the safe passage of hen harriers moving between its nesting, feeding and/or roosting areas	The ability of the species to safely and successfully move to and from nesting, feeding and roosting areas is critical to their breeding success and to 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. The home range of hen harriers is known to extend several kilometres from their nesting territory, with breeding birds hunting up to 2kms from a nest.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability within supporting habitat	Maintain the distribution, abundance and availability of key prey items (small mammals and birds) at prey sizes preferred by Hen harrier.	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. The diet of Hen harriers primarily consists of small mammals and small birds, such as field voles, meadow pipits and skylarks, although it can also include larger prey such as grouse, wading birds and young rabbits. Evidence suggests that numbers of small bird prey species such as meadow pipit are not a restricting factor in restoring the population e.g. 1278 pairs of meadow pipit recorded across a part of the SPA in 2017 while Wilkinson & Douglas reported increases in meadow pipit numbers between 2005 and 2014. The role and impact of other prey species such as voles on the population within the SPA is uncertain.	WILKINSON & DOUGLAS (2015); BOWLAND ECOLOGY (2016); WATERMAN INFRASTRUCTURE & ENVIRONMENT LIMITED (2017)
Version Control Advice last updated: 19 March 2019: additional information added to the targets and supporting/explanatory notes for 'extent and distribution of supporting habitat', 'conservation measures', 'food availability' and 'vegetation characteristics' following stakeholder comments on a draft version of this advice.				
Variations from national feature-framework of integrity-guidance: Attribute for Supporting habitat: function/ supporting process; water quality/quantity has been removed as it is not relevant to the conservation of the feature				

Table 2: Supplementary Advice for Qualifying Features: A098. *Falco columbarius*; Merlin (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 merlin population to a level which is consistently above 21 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest breeding survey count.	This will sustain the site's population and ensures it contributes to a viable local, national and bio-geographic population. See supporting and explanatory notes for this attribute above in Table 1. Latest estimates are that the SPA holds approximately 8 pairs of Merlin although the data is uncertain.	WILKINSON & DOUGLAS (2015); BOWLAND ECOLOGY (2016); WATERMAN INFRASTRUCTURE & ENVIRONMENT LIMITED (2017)
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Restore management or other measures (whether within and/or outside the site boundary as appropriate) necessary to restore the structure, function and/or the supporting processes associated with breeding merlin and its supporting habitats.	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. 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. The principal measures required are the appropriate management of supporting habitat used by breeding merlin (including blanket bog, dry and wet upland heath and acid grassland) and the avoidance of disturbance to nesting birds during the breeding season.	NATURAL ENGLAND, 2014. ENGLISH NATURE, 2005.
Supporting habitat (within the SPA): predation	Predation	Restrict the predation of and disturbance to breeding Merlin 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. Should evidence suggests predator management is required, measures might include their exclusion through fencing 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.	.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): extent and distribution	Extent and distribution of supporting breeding habitat	Maintain and restore the extent, distribution and availability of suitable breeding habitat which supports breeding merlin for all necessary stages of its breeding cycle (courtship, nesting, feeding): Maintain 2,840 ha of active bog and restore 4,967ha of degraded bog Maintain 3,533 ha and restore 792 ha of dwarf shrub heath	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. 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 boundary. At this SPA, supporting habitats include open moorland vegetation comprising a mix of blanket bog, dry upland heath and acid grassland, with occasional stands of bracken. The current balance (allowing for some dynamic habitat changes away from key breeding locations) to be broadly retained is approximately 50% blanket bog, 25-30% wet and dry heath and the remainder comprising mostly grassland with occasional flushes and some clough woodland	NATURAL ENGLAND, 2012.
Supporting habitat (within the SPA): structure	Vegetation characteristics	Maintain an optimal mix of vegetation to provide sufficient cover for nesting and more open, prey-rich, vegetation for hunting.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/ rearing/ 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. For nesting, merlin prefer stands of undisturbed mature/degenerate heather and other medium to tall ground vegetation which is typically >50cms in height, especially in areas which have historically proved to be favourable nesting areas. Stands of mature heather should ideally be present in patches >2 ha in size, with scattered trees particularly in cloughs. For hunting, open areas of heath and bog should be present alongside long and tussock-forming grasslands with wet flushes interspersed with patches of bracken or low trees/scrub. These open habitats should have varied vegetation heights to provide cover and food (invertebrate/seed) for small mammals and birds which in turn are important prey items.	NATURAL ENGLAND, 2012.
Supporting habitat (within the SPA): disturbance	Minimising disturbance caused by human activity	Restrict the frequency, duration and/or intensity of disturbance affecting nesting, roosting, foraging or feeding, birds so that the breeding merlin	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,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		population is not significantly disturbed	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 contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals and structures.	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain a high proportion of open and unobstructed terrain within and around nesting and feeding areas.	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 supporting habitat.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability within supporting habitat	Maintain the overall availability of small birds and day-flying moths preferred by merlin during the breeding season.	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. Merlin feed mainly on small birds such as meadow pipit and skylark, although small mammals and insects are often important. Evidence suggests that numbers of small birds prey species such as meadow pipit are not a restricting factor in restoring the population e.g. 1278 pairs of meadow pipit recorded across a part of the SPA in 2017 while Wilkinson & Douglas reported increases in meadow pipit numbers between 2005 and 2014. The impact of food availability on the recovery of merlin within the SPA is uncertain, but may be a factor in the recovery of the species.	WILKINSON & DOUGLAS (2015) BOWLAND ECOLOGY (2016) WATERMAN INFRASTRUCTURE & ENVIRONMENT LIMITED (2017)
Version Control Advice last updated: 19 March 2019: 19 March 2019: additional information added to the targets and supporting/explanatory notes for 'extent and distribution of supporting habitat', 'conservation measures', 'food availability' and 'vegetation characteristics' following stakeholder comments on a draft version of this advice.				
Variations from national feature-framework of integrity-guidance: Attribute for Supporting habitat: function/ supporting process; water quality/quantity has been removed as it is not relevant to the conservation of the feature. Attribute for Supporting habitat: function/ supporting process; air quality has been removed as this feature is not considered sensitive to this attribute				

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