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

Somerset Levels and Moors Special Protection Area (SPA) Site Code: UK9010031

Westhay Moor SSSI in winter. (Photo: Barry Phillips)

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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Somerset Levels and Moors 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	Somerset Levels and Moors Special Protection Area (SPA)
Location	Somerset
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	26 June1997
Qualifying Features	Non-breeding (overwintering): • Bewick's Swan *Cygnus columbianus bewickii* A037 • Eurasian Teal *Anas crecca* A052 • European Golden Plover *Pluvialis apricaria* A140 • Northern Lapwing *Vanellus vanellus* A142 • Waterbird assemblage
Designation Area	6394.18 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)	Catcott Edington and Chilton Moors SSSI Curry and Hay Moors SSSI King's Sedgemoor SSSI Moorlinch SSSI Shapwick Heath SSSI Southlake Moor SSSI Tealham and Tadham Moors SSSI West Moor SSSI West Sedgemoor SSSI Westhay Heath SSSI Westhay Moor SSSI Wet Moor SSSI
Relationship with other European or International Site designations	The boundary of this SPA coincides with the Somerset Levels and Moors Ramsar Site (Site Code: UK11064) This SPA is ecologically linked to the Severn Estuary SPA with bird species notified as mobile qualifying features using either the inland or coastal European Sites as alternative winter feeding grounds according to weather conditions.

Site background and geography

The SPA is comprised of 12 SSSIs located across the Somerset Levels and Moors floodplain. Five are in the Brue Valley to the north of the low ridge of the Polden Hills, while the remainder are on the floodplains of the Rivers Parrett and Tone to the south.

The Somerset Levels and Moors is a unique landscape in the British Isles and has achieved widespread recognition in the public mind for its extensive flatness and frequent floods. The open expanse of grasslands broken up by isolated hills and ridges is some of the lowest land in the UK, with large areas lying below the level of the highest tides. Water dominates the landscape and a complex network of watercourses is evidence of a long history of drainage to reclaim productive farmland from marshland. It remains largely pastoral and was once renowned for its dairy herds. Today, beef production is the most common enterprise but its future is uncertain in some areas as structural reform in the agricultural industry, market pressures and social changes render marginal areas less viable even for extensive farming. The peat-cutting industry of the Brue Valley in the north of the floodplain has declined dramatically in recent years, and worked-out areas are now reverting to biodiversity-rich wetland habitats. A detailed description of the area's natural and cultural features can be read in the Somerset Levels & Moors National Character Area profile (NCA Profile 142)

Its nature as a floodplain means that the Levels and Moors will always be a landscape in transition. The rivers drain to the Bristol Channel, which has the second highest tidal range in the world. Ground levels on inland moors can be up to 6 metres below peak tide levels. Over the centuries, a complex system of sea walls, elevated river banks and pumping stations developed in a piecemeal way to protect settlements and farmland. More intensive farming was made possible by pump-drainage, which inevitably compromised the survival of wetland biodiversity.

Today, the Somerset Levels and Moors contain the largest area of lowland wet grassland in England: 21% of the resource. Huge flocks of migratory waterfowl arrive in winter; more than at any other inland site in the UK. Its importance is year-round as it is one of the UK's most important breeding areas for Lapwing, Curlew, Redshank and Snipe: wading birds that depend on extensively grazed wet grassland. Meadows with more than 60 species in a single field and ditches supporting a unique assemblage of rare invertebrates add to its diversity.

The floodplain's surviving biodiversity is recognised by a series of statutory designations. There are 17 Sites of Special Scientific Interest reflecting the national importance of 7,300 ha for lowland wet grassland, breeding wader populations and aquatic invertebrates. Twelve of the SSSIs, covering almost 6,400 ha, have been classified as important for wintering wildfowl and designated a Special Protection Area under the EC Birds Directive. The tiers of conservation designations are completed by recognition under the Ramsar Convention that the best habitats on the floodplain are notable for rare aquatic invertebrates and wintering waterbirds, making it one of the world's premier wetlands.

The accumulation of designations makes it easy to lose sight of the fact that together they cover only 12% of the area of the floodplain. While they have helped attract limited investment to protect their biodiversity, little attention and few resources are given to the remainder, optimistically known as the "wider wetland". Much of the area outside the designated sites is a farmed grassland monoculture: too dry at critical times of the year to support wetland wildlife. This does not mean that it will always be of substantially lower value for wildlife. Promoting sustainable flood management and farming practices tailored to a wetland environment would rapidly reverse past losses and provide greater protection for the SPA.

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 (Article 4.1)

During the non-breeding season the SPA regularly supports:

- **Bewick's Swan *Cygnus columbianus bewickii* (non-breeding) A037**

When the SPA was notified it supported a peak mean of 310 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 4.4% of the British and 1.8% of the North-west European overwintering population.

Since notification there has been a dramatic decline in numbers visiting the SPA with a 5-year peak mean of 5 individuals in the period 2012/13 to 2016/17. This reflects national and international trends since the mid-1990s. WeBS (Wetland Birds Survey) High Alerts have been issued for the medium (-80%) and long (-89%) terms.

The reasons behind the decline remain unclear. Unfavourable conditions on breeding grounds, staging areas and overwintering sites are all possible reasons. Fewer birds now cross the North Sea in mild winters, and this phenomenon partly explains the recent decline in numbers visiting Great Britain. Populations can also fluctuate from year to year in relation to the severity of winters. Numbers visiting the Somerset Levels and Moors had already declined in the years before the SPA was notified at a time when the national population had increased. The reason was not identified, but it was speculated that it may have been due to a reduction in winter floods.

In winter Bewick's Swan are found on flooded grassland, large waterbodies and estuaries, where they roost on water and feed on grasses and submerged vegetation. It also forages on waste root crops, grain stubbles and winter cereals. This species is very sensitive to disturbance.

- **European Golden Plover *Pluvialis apricaria* (non-breeding) A140**

When the SPA was notified it supported a peak mean of 3,110 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 1.2% of the British population.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 14,024 individuals in the period 2012/13 to 2016/17.

Golden Plover is an Annex 1 species and recent numbers of overwintering birds on the Somerset Levels and Moors exceed the threshold required for international importance. There is widespread variation in numbers at site, regional and national scales making analysis of trends difficult.

In winter Golden Plover have similar habitat requirements to Lapwing and these species are frequently found associating on inland and coastal sites. Flocks are highly mobile responding to prevailing weather conditions, available food resources and levels of disturbance. It is less dependent than most waders on shallow flood events to provide favourable feeding conditions.

Qualifying individual species not listed in Annex I of the Wild Birds Directive (Article 4.2)

During the non-breeding season the SPA regularly supports:

- **Eurasian Teal *Anas crecca* (non-breeding) A052**

When the SPA was notified it supported a peak mean of 7,476 individuals in the five-year period from 1989/90 to 1993/94. This number represented at least 5.3% of the British and 1.9% of the North-west European overwintering population.

Since notification there has been a substantial increase in numbers with a peak mean of 21,918 individuals in the period 2012/13 to 2016/17. The Somerset Levels and Moors is now the most important overwintering site for Teal in Great Britain.

The rate of increase in the Somerset Levels and Moors SPA has been higher than regional and national trends, emphasising its exceptional importance as a refuge for this species. Numbers usually peak in January or February with the majority of birds (70%) concentrated on West Sedgemoor SSSI, part of which is an RSPB reserve.

The disproportionately high numbers recorded on RSPB reserves on the Somerset Levels and Moors applies to other species, and demonstrates what can be achieved when the primary objective is to provide undisturbed feeding and roosting conditions for wetland birds. It must be noted that counts are made during the daytime when birds are mainly roosting. At night, they may disperse to other parts of the SPA and land of functional importance outside it to feed (Chown, 2001). The scale of movements over the course of the day is not known.

Parts of some component SSSIs, such as King's Sedgemoor (West) and Aller Moor are sub-optimal for Teal because of interrupted sightlines and disturbance. It is not known why numbers remain very low on King's Sedgemoor East when a Raised Water Level Area is maintained over 159 ha.

The neighbouring Severn Estuary SPA also supports an internationally significant number of Teal: a peak mean of 6,210 in the period 2012/13 to 2016/17.

In winter Teal prefer shallow water conditions in a wide range of wetland habitats including flooded grassland, bays of large waterbodies and estuaries. It is extremely sensitive to disturbance, and particularly vulnerable to severe cold weather. Maintenance of extensive areas of shallow water across the SPA is essential to support the population at its current level.

- **Northern Lapwing *Vanellus vanellus* (non-breeding) A142**

When the SPA was notified it supported a peak mean of 36,565 individuals in the five-year period from 1989/90 to 1993/94.

Since notification there has been a decline in numbers with a peak mean of 32,896 individuals in the period 2012/13 to 2016/17. A WeBS (Wetland Birds Survey) Medium Alert has been issued for the medium term (-31%). The overwintering population in Great Britain has also declined significantly since the 1990s.

In winter Lapwing frequent a wide variety of habitats, both coastal and inland. Flocks can be highly mobile responding to prevailing weather conditions, available food resources and levels of disturbance. Although mainly associated with wet grassland throughout the year they are often found on ploughed land and frequently roost at coastal sites.

The majority of the overwintering population (59%) on the Somerset Levels and Moors are supported on two RSPB reserves: West Sedgemoor SSSI within the SPA, and Greylake Reserve, which is outside but links two SPA component SSSIs (Moorlinch and King's Sedgemoor). Like Teal and other overwintering waterbirds, Lapwing will fly from these refuges at night to feed on land inside and outside the SPA boundaries (Chown, 2001). The scale of movements over the course of the day is not known.

Qualifying assemblage of species (Article 4.2)

In winter the SPA regularly supports an assemblage of waterfowl of more than 20,000 birds. When the SPA was notified the 5-year peak mean for the five-year period from 1989/90 to 1993/94 was 58,093, comprising 41,442 waders and 16,651 wildfowl.

In addition to the Annex 1 and 2 species featured above (Bewick's Swan *Cygnus columbianus bewickii*, Golden Plover *Pluvialis apricaria*, Teal *Anas crecca* and Lapwing *Vanellus vanellus*), the assemblage included Gadwall *Anas strepera*, Wigeon *Anas penelope*, Shoveler *Anas clypeata*, Pintail *Anas acuta*, Snipe *Gallinago gallinago* and Whimbrel *Numenius phaeopus*.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 90,205 individuals in the period 2012/13 to 2016/17. The representation of species exceeding national and international population thresholds in the assemblage has changed with eight species exceeding the international threshold (Golden Plover *Pluvialis apricaria*, Teal *Anas crecca,* Lapwing *Vanellus vanellus,* Gadwall *Anas strepera*, Wigeon *Anas penelope*, Shoveler *Anas clypeata*, Pintail *Anas acuta* and Mute Swan *Cygnus olor*), and five exceeding the national threshold (Bittern *Botaurus stellaris*, Little Egret *Egretta garzetta*, Ruff *Philomachus pugnax* and Green Sandpiper *Tringa ochropus*).

Gadwall *Anas strepera*

When the SPA was notified it supported a peak mean of 94 individuals in the five-year period from 1989/90 to 1993/94, which represented 1.2% of the British population.

Since notification numbers have increased with a 5-year peak mean of 618 individuals in the period 2012/13 to 2016/17. However, there are indications of a decline in overwintering numbers on the SPA with WeBS Medium Alerts issued for the short (-42%) and medium (-40%) terms.

In winter Gadwall prefer large waterbodies, including permanently flooded voids on former peat excavation sites in the Brue Valley and are less likely to be found on shallow flooded grassland.

Pintail *Anas acuta*

When the SPA was notified it supported a peak mean of 148 individuals in the five-year period from 1989/90 to 1993/94.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 922 individuals in the period 2012/13 to 2016/17.

This highly mobile species occurs in small numbers across the floodplain. It is mainly found dabbling in open water, but it also grazes on pastures and marsh and forages for spilt grain on cereal fields.

Wigeon *Anas Penelope*

When the SPA was notified it supported a peak mean of 5,927 individuals in the five-year period from 1989/90 to 1993/94, which represented 2.1% of the British population.

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 23,543 individuals in the period 2012/13 to 2016/17, which exceeds the international threshold. The Somerset Levels and Moors is the third most important overwintering site in Great Britain after the Ribble Estuary and Ouse Washes.

In winter Wigeon are found predominantly on estuarine mudflats, saltmarshes and coastal pastures. About 20% of the national population overwinter on inland sites where they feed on short swards and sometimes crops. Large areas of un-flooded but wet grassland need to be maintained to sustain this species.

Numbers of Wigeon on the Somerset Levels and Moors usually peak in January or February. The highest concentration of birds is on West Sedgemoor with 11, 375 individuals: 42% of the total. Daytime counts confirm the value of West Sedgemoor and other safe roosts, but it is known that at night birds disperse from them to feed elsewhere in the SPA and land of functional importance outside it (Cheung, 2001). Extensive and prolonged deep water floods are detrimental to its presence on the Somerset Levels and Moors.

Shoveler *Anas clypeata*

When the SPA was notified it supported a peak mean of 217 individuals in the five-year period from 1989/90 to 1993/94, which represented 2.1% of the British population.

Since notification there has been an increase in numbers with a 5-year peak mean of 1380 individuals in the period 2012/13 to 2016/17, which exceeds the international threshold. Numbers within the SPA have increased at a faster rate than at the regional and national scales. In winter, Shoveler depend on shallow areas of open water and flooded grassland. When flooded, West Sedgemoor is particularly important within the SPA with a 5-year peak mean of 372 individuals.

It is a dabbling duck which prefers larger bodies of permanent water, although it will also feed on flooded grassland.

Snipe *Gallinago gallinago*

The five-year peak mean for the period 1991/92 to 1995/96 (selected to include the earliest reported year for this species on the SPA) was 1768 individuals.

A peak mean of 1,254 individuals was recorded in the period 2012/13 to 2016/17. The Somerset Levels and Moors remains the most important overwintering site for Snipe in Great Britain. A combination of perfect camouflage and secretive behaviour makes this species notoriously difficult to count accurately, and the overwintering population will be higher.

Snipe depend on soft, wet ground to feed, and will move to the coast to escape freezing conditions inland.

Notable non-qualifying species of birds on the Somerset Levels and Moors

The SSSIs within the SPA and NNRs and reserves outside it also support an important assemblage of breeding and wintering birds. In addition to the species mentioned above, the Annex 1 species Bittern *Botaurus stellaris,* Little Egret *Egretta garzetta,* Great White Egret *Ardea alba* and Marsh Harrier *Circus aeruginosus* breed and overwinter. Other regular Annex 1 winter visitors are Merlin *Falco columbarius,* Peregrine *Falco peregrinus,* Hen Harrier *Circus cyaneus* and Short-eared Owl *Asio flammeus*. The Somerset Levels and Moors remains nationally important for its breeding wader assemblage (principally Lapwing *Vanellus vanellus*, Snipe *Gallinago gallinago*, Redshank *Tringa totanus* and Curlew *Numenius arquata)*, but numbers have declined significantly and its future has become increasingly dependent on raised water level areas in SSSIs acting as refugia.

References:

Nagy, S., Petkov, N., Rees, E., Solokha, A., Hilton, G., Beekman, J. and Nolet, B. 2012. International Single Species Action Plan for the Conservation of the Northwest European Population of Bewick's Swan (Cygnus columbianus bewickii). AEWA Technical Series No. 44. Bonn, Germany.

Chown, D. 2001. Nocturnal use of the Somerset Levels and Moors floodplain by overwintering waterfowl: 2000/2001, A report to the English Nature Somerset Team.

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
Bewick's Swan	Non-breeding	Winter													
Golden Plover	Non-breeding	Winter													
Teal	Non-breeding	Winter													
Lapwing	Non-breeding	Winter													
Waterbird Assemblage	Non-breeding	Winter													

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 Non-breeding Qualifying Features: Bewick's Swan *Cygnus columbianus bewickii* (A037), European Golden Plover *Pluvialis apricaria* (A140), Eurasian Teal *Anas crecca* (A052), Northern Lapwing *Vanellus vanellus* (A142) and Waterbird Assemblage

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Non-breeding population	**Population abundance**	**Bewick's Swan** Restore the size of the non-breeding population to a level which is at or above 310 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. **Golden Plover** Maintain the size of the non-breeding population at a level which is at or above 3,110 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. **Teal** Maintain the size of the non-breeding population at a level which is at or above 7,476 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This will sustain the site's population and contribute 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 abundance 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 (generally at least 10 years). 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	The latest data can be requested via the BTO (British Trust for Ornithology) website.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Lapwing Restore the size of the non-breeding population at a level which is at or above 36,565 individuals (calculated at a 5-year peak mean at time of notification), while avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	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. 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.	
Assemblage of species	**Assemblage abundance**	**Assemblage of Waterfowl** Maintain the overall abundance of the non-breeding assemblage at a level which is above 20,000 individual wintering wetland birds, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. The non-breeding assemblage of waterfowl was 58,093 individuals (calculated at a 5-year peak mean) at time of notification.	This will sustain the assemblage population and contribute to viable local, national and bio-geographic populations of its component species. Assemblage abundance is the annual sum of peak counts of each assemblage component species (at any time of year, though peaks tend to occur in the non-breeding season), unless otherwise stated. Five year peak means are the average of these annual peak sums for the relevant period. An assemblage component is any waterbird using the site. Due to the dynamic nature of assemblage component populations, this target may be subject to periodic review. However, the target assemblage abundance is considered to be the minimum standard for conservation or restoration measures and therefore where at any time the assemblage abundance is greater than the target value given, any measure or impact assessment should take account of the greater abundance. This meets with the obligation to avoid deterioration of a European site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects giving rise to the risk of such deterioration or disturbance.	JNCC SPA description Somerset Levels and Moors SPA citation document (March 1995). Available here: http://publications.naturalengland.org.uk/publication/4598158654963712 The latest data can be requested via the BTO (British Trust for Ornithology) website.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Whether to maintain or restore depends on the overall assemblage abundance (i.e. the peak mean derived from the summed peak counts of components), and should only change in response to this value, excepting natural change. Fluctuations of individual assemblage component species alone should not necessarily change the target. Assemblage abundance is linked to the demographic rates of assemblage components, 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 (particularly for the main or named components) to inform judgements of likely changes to the assemblage and associated impacts on abundance targets. 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.	
Assemblage of species	**Diversity of species**	**Assemblage of Waterfowl** Maintain the species diversity of the bird assemblage.	This will ensure the bird assemblage reflects the diversity of species the SPA supports. Assemblage diversity is a product of species richness (the number of different species present), abundance (population size of each assemblage component species) and relative 'importance' (an assessment of the conservation status of each assemblage component, described below). Each component makes a different contribution to the diversity of the assemblage, and changes to some components may be	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			considered to affect diversity more than others. Negative changes to small numbers of relatively important assemblage components may have a similar overall effect to negative changes in larger numbers of less important components. To meet the target, the populations of each of the 'main component' assemblage species to be maintained or restored are i) those present in nationally important numbers (≥1% GB population); ii) migratory species present in internationally important numbers (≥1% biogeographic population); iii) those species comprising ≥2,000 individuals (≥10% of the minimum qualifying threshold for an internationally-important assemblage); and iv) 'named components' otherwise listed on the SPA citation. In addition to the main components, other components should be considered as these contribute collectively to the assemblage diversity, in particular proportionally abundant populations of species of conservation importance. Examples are those 'red-listed' as Birds of Conservation Concern and/or those listed on Sections 41/42 of the Natural Environment and Rural Communities Act 2006. The species composition of an assemblage may change over time. However, to meet this target, the total number of all native waterbird species contributing to the assemblage species richness should not decline significantly.	
Supporting habitat (both within and outside the SPA): extent and distribution	**Extent and distribution of supporting non-breeding habitat**	Maintain the extent and distribution of suitable habitat within and outside the SPA boundary) which supports the qualifying features for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, 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. 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 also applies to supporting habitat (habitats of functional importance for qualifying features) which lies outside the SPA boundary.	More detailed information for each component part of the SPA may be available from Natural England. Somerset Levels and Moors Natural Area. A nature conservation profile. English Nature (1997). Natural England 2014

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Land and open water: 6394.18 ha. Within the SPA boundary: grazing marsh, fen, reedbeds, species-rich and species poor neutral grassland, open water, rivers, artificial drainage channels and ditches. Outside the SPA boundary: an unquantified area of land of functional importance for qualifying features.	The grassland community types within each component SSSI are a complex mosaic of species-rich and species-poor neutral grassland, fen, mire and swamp communities. Land of functional importance on the floodplain outside the SPA boundary includes arable land, species-poor grassland, species-rich grassland and a variety of wetland habitats in nature conservation reserves, such as the RSPB reserves at Ham Wall and Greylake. The SPA's capacity to support and sustain an assemblage comprising a very large number of birds (in excess of 20,000) made up of a diverse mix of species will be reliant on the overall quality and diversity of the habitats that support them. The feeding and roosting habitats which support the assemblage occur within and outside the site boundary. This target is applicable to both circumstances. Due to the large number of species and natural fluctuations in the overall composition of an assemblage, it is not practical to provide specific targets relating to each supporting habitat relevant to the assemblage. Generally speaking, the specific attributes of each supporting habitat may include vegetation characteristics and structure, water depth, food availability, connectivity between nesting, roosting and feeding areas both within and outside the SPA. Further advice will be provided by Natural England on a case by case basis.	Site Improvement Plan: Somerset Levels and Moors
Supporting habitat (both within and outside the SPA): **function/ supporting process**	**Water quantity**	Maintain the supply of water to a standard which provides the necessary conditions to support the qualifying features of the SPA. In winter the flood regime must provide a mixture of splash, shallow and deep flooded areas.	For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. The presence of overwintering SPA birds on the floodplain depends on a complex integrated approach to water level and flood risk management. Raised Water Level Areas (RWLAs) provide a safety net to ensure the presence of qualifying features, but the continuation	"Conservation Requirements for the Somerset Levels and Moors SPA/Ramsar/SSSI and Wider Wetland." English Nature (1999). Water level management on component SSSIs is implemented in line with 10 Water Level Management Plans (WLMPs) approved by Natural England, the Environment Agency and the

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Continue to facilitate a pattern of natural low level flood events across the floodplain each winter. Favourable water levels must be maintained from 1 December to the end of February. **Target conditions across the SPA:** **Splash** conditions (field level to 10 cm deep) should occur over at least 30% of the SPA and the majority of component SSSIs. **Shallow** conditions (10 to 30 cm deep) should occur over 10 to 25% of the SPA and the majority of component SSSIs. Ideally, shallow flooding should occur over at least 20 ha when combined with at least 20 ha of deep flooding. **Deepe**r conditions (25 to 75 cm deep) should occur over at least 5 to 10% of the SPA, but not necessarily every component SSSI. Ideally, deep flooding should occur over at least 20 ha when combined with at least 20 ha of shallow flooding. **Target conditions at field scale:**	of natural low-level flood events across the floodplain each winter is essential to for the survival of qualifying features within and outside the SPA boundary. During the winter months, the number of waterfowl present is influenced by the extent of controlled and uncontrolled flooding. This becomes critical when freezing conditions elsewhere displace more birds to the Somerset Levels and Moors. Maintenance of favourable water levels is essential to attract wintering waterfowl. The extent of shallow flooding should be achieved by the first week in December and reduced gradually from the end of February until it is gone by mid-March. Areas managed for deep flooding should be ready by mid-December and water removed gradually from mid-February until it is gone by early March. Achievement of the target in November and March will be influenced by prevailing weather conditions, particularly droughts and flood events. Splash flooding provides conditions for Wigeon and Teal to feed, and after receding leaves damp ground that attracts Snipe, Lapwing and Golden Plover. Shallow flooding is necessary to provide undisturbed feeding areas and roosting sites for ducks and roosting sites for waders. Areas of shallow or deep flooding covering at least 20 ha need to be close to areas of at least 20 ha of splash, shallow or deep flooding to act as a minimum refuge size for waterfowl. At the time of writing, the extent of shallow flooding is a little less than required. Deep flooding is necessary to provide feeding areas and roosting sites for Bewick's Swan and ducks. Water levels in excess of the defined range can be evacuated, when and where possible. Sometimes, more water may need to be	Parrett Internal Drainage Board inn July 2011: Bridgwater & Pawlett WLMP (2009) Othery, Middlezoy, Westonzoyland & Chedzoy WLMP (2009) West Sedgemoor WLMP (2009) North Drain WLMP (2010) South Drain WLMP (2010) Wet Moor WLMP (2010) West Moor WLMP (2010) King's Sedgemoor & Aller Moor (2010) North Moor & Salt Moor (2010) Curry Moor (2011)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Early winter (from mid-November): water levels should rise gradually to create extensive pools covering 20 to 50% of most fields with the lowest lying fields being close to 50% inundated. **Mid-winter** (1 December to the end of February): extensive areas of splash flooding and shallow pools up to 25 cm deep covering at least 50% of most fields with deep water roost sites covering at least 60 ha with water 25 to 75 cm deep. **Late winter to early spring** (31 March): water levels should be lowered gradually to leave splash conditions with shallow pools in the lowest lying fields.	removed to prevent anoxic conditions from developing during mild weather or when shallow or deeper water has been present continuously between December and February. Prolonged deep water flooding can reduce the extent and quality of feeding habitat because probing waders are unable to reach food sources. At the time of writing, the area of deep water exceeds the target. Sufficient deep water for safe roosts exists in the Brue Valley in the form of flooded peat excavations at Shapwick and Westhay SSSIs, and on the Parrett floodplain at West Sedgemoor and Southlake. In severe cold weather, the wider water courses, and in particular the King's Sedgemoor Drain, are used as ice-free roost sites.	
Supporting habitat (both within and outside the SPA): **Function /supporting process**	**Water quality**	**Water quality target** The SPA qualifying features are relatively insensitive to organic and nutrient pollution. The current water quality of the Somerset Levels and Moors is likely to be adequate to support the SPA qualifying features.	Poor water quality can adversely affect the availability and suitability of feeding and roosting habitats. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the SPA Conservation Objectives but in some cases more stringent standards may be needed to support the SPA feature. The main source of lowered water quality through the Somerset Levels and Moors is diffuse water pollution, caused primarily by high phosphate levels from nutrient enrichment (inorganic and organic agricultural fertilisers, soil loss from arable land and overflows from private septic tanks). Point sources of pollution mainly occur at sewage treatment works.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Although water quality is unlikely to pose a risk to the SPA qualifying features, it is relevant that the ditch aquatic plant and invertebrate communities of the coincident Ramsar Site are suffering from the effects of hyper-eutrophication. Measures to reverse this are in place through PR19 (Ofwat), CSF (Catchment Sensitive Farming Programme) and the Somerset Levels and Moors Ramsar Diffuse Water Pollution from Agriculture Plan. These measures are forecast to improve water quality. The Environment Agency has also undertaken nutrient modelling to identify the relative importance of diffuse and point sources to nutrient enrichment in the catchment and is working with the water companies to reduce nutrient discharges from sewage treatment works. Acute problems associated with catastrophic pollution events need to be dealt with on a case-by-case basis.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Conservation measures**	Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and/or the supporting processes associated with the feature and its supporting habitats. Grassland used by SPA birds should be managed by grazing, or mowing and removing field-dried hay followed by aftermath grazing. By November, the sward should be a mixture of grass tussocks and areas of	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 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 suite of conservation management measures necessary to support overwintering SPA birds encompasses mowing and grazing low input meadows, maintaining the extensive ditch system to supply and remove water, sympathetically managing ditches to maintain the plant and invertebrate assemblages, controlling water levels across component SSSIs, maintaining artificial Raised Water Level Areas (RWLAs) designed to	"Conservation Requirements for the Somerset Levels and Moors SPA/Ramsar/SSSI and Wider Wetland." English Nature (1999). Water level management on component SSSIs is implemented in line with 10 Water Level Management Plans (WLMPs) approved by Natural England, the Environment Agency and the Parrett Internal Drainage Board inn July 2011: Bridgwater & Pawlett WLMP (2009) Othery, Middlezoy, Westonzoyland & Chedzoy WLMP (2009) West Sedgemoor WLMP (2009)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		shorter grass from 5 to 15 cm in height. Livestock should be removed by the end of November. Fields should support a mixture of grasses and herbs with some patches of rushes and sedges to provide vegetation and seeds for ducks and swans to eat in winter. Habitats within the SPA should support abundant populations of aquatic and soil invertebrates for ducks and waders to eat in winter. The landscape should remain relatively free of tall trees and scrub to provide sightlines for birds of over 200 m to reduce excessive predation in feeding areas and roost sites. In winter (1 December to 31 March), water in ditches (locally called "rhynes") must be at least 30 cm deep.	provide appropriate water levels for SPA birds, maintaining flooded voids in the peat production zone, controlling invasive plant species and minimising the level of disturbance caused by human activities. Land management measures in most of the SPA are currently delivered through voluntary agri-environment scheme agreements. A succession of schemes have secured the short-term future for qualifying features, but changes in requirements as schemes evolve and uptake varies makes it difficult to guarantee the long-term integrity of privately-owned Raised Water Level Areas (RWLAs). Outside the SPA, uptake of new agreements is low and there is an increasing risk that agricultural intensification will affect land of functional importance for qualifying features. Landowners always have the option of ending agreements at the 5-year break point, which contributes to uncertainty over the future. Water level management measures are delivered through Water Level Management Plans (WLMPs).	North Drain WLMP (2010) South Drain WLMP (2010) Wet Moor WLMP (2010) West Moor WLMP (2010) King's Sedgemoor & Aller Moor (2010) North Moor & Salt Moor (2010) Curry Moor (2011)
Supporting habitat (both within and outside 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. Maintain concentrations and deposition of air pollutants to at or below the site-relevant Critical	The structure and function of 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	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.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	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.	
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 within close proximity of affecting roosting, foraging, feeding, moulting and/or loafing birds so that the qualifying features are 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, and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful 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. Daytime use of feeding areas and roost sites by SPA birds will be minimal if the level of disturbance is an issue. Management of public access, through pedestrian and vehicle access strategies, visitor management plans and promoting	Natural England 2014 Site Improvement Plan: Somerset Levels and Moors

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			awareness of the sensitivity of particular areas, can reduce disturbance to over wintering bird populations Development of settlements and a corresponding increase in the human population on and around the floodplain may lead to an increase in levels of disturbance to qualifying features on some parts of the SPA and associated functional land. Measures to reduce the impact of recreational disturbance might include provision of greenspace within settlements and educational information on the sensitivity of birds to disturbance	
Supporting habitat (both within and outside the SPA): structure	**Landscape**	Maintain open and unobstructed terrain within and around roosting and feeding areas with no overall decrease in field sizes	The qualifying features favour large areas of open terrain, largely free of obstructions in and around roosting and feeding areas to detect approaching predators. Bewick's Swan requires an unimpeded sightline of 500 m at feeding, roosting and refuge sites.* The other qualifying features require an unimpeded sightline of 200 m at feeding, roosting and refuge sites.*	*Natural England & the Countryside Council for Wales' advice for the Seven Estuary European Marine Site given under Regulation 33(2) (a) of the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (June 2009).
Supporting habitat (both within and outside the SPA): function/ supporting process	**Connectivity with supporting habitats**	Maintain the safe passage of birds moving between roosting and feeding areas within and outside the component SSSIs and between the Somerset Levels and Moors and Severn Estuary SPAs.	The ability of the feature to safely and successfully move to and from 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. Structures and wind-turbines located between component SSSIs, functionally-linked land on the floodplain and in the flyway between the Somerset Levels and Moors and Severn Estuary SPAs may lead to increased mortality of SPA birds through collisions and displacement from feeding habitats and roost sites. Research into the role of the flyway between the estuary and inland moors and the extent and importance of functionally-linked land outside the SPA boundary is required.	Natural England 2014 Site Improvement Plan: Somerset Levels and Moors

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**	**Bewick's Swan** Maintain the availability of cereal grains, rape, potatoes and sugar beet, where these sources are locally important to feeding flocks. **Golden Plover and Lapwing** Maintain the availability of key invertebrate prey species (e.g. earthworms and beetles) of preferred prey sizes. **Teal** Maintain the cover/abundance of preferred food plants (e.g. *Polygonum, Eleocharis, Rumex, Ranunculus, and Juncus*). **Assemblage** Maintain the cover/abundance of preferred food plants and availability of key invertebrate prey species.	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. In winter, Bewick's Swans forage mainly by day feeding on grasses, aquatic plants, leftover grains and other crops, such as potatoes and beets. The serious decline in the overwintering population on the Somerset Levels and Moors makes it difficult to recommend the extent of feeding habitat necessary restore it to the level when the SPA was notified. Research is needed on the extent and suitability of arable land outside the SPA boundary that has the potential to support this species. An increase in the extent of arable land on the floodplain is not seen as necessary to reverse the population decline. Golden Plover and Lapwing feed primarily on earthworms and insects and their larvae. In winter, these species feed across the floodplain mainly by day, but sometimes at night. Teal prefer to feed at night in winter to avoid disturbance, but can be in active in the day in quiet locations. It mainly forages for seeds on grassland in winter but can feed on stubble. Research is needed to establish the scale of nocturnal use of land outside the SPA by foraging qualifying species.	
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				