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

Hornsea Mere
Special Protection Area (SPA)
Site Code: UK9006171

Photos: Natural England

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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Hornsea Mere SPA. This advice should therefore be read together with the SPA Conservation Objectives available online 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	Hornsea Mere Special Protection Area (SPA)
Location	East Riding of Yorkshire
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	*30 Jan 1996 - classified 05/03/1993*
Qualifying Features	A036 - Post Breeding and Moulting Mute Swan *Cygnus olor* A051 - Over-wintering Gadwall *Anas strepera*
Designation Area	120ha
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)	Hornsea Mere SSSI is entirely coincident with, and underpins, the European Site
Relationship with other European or International Site designations	Potentially Greater Wash SPA (Little Gull) - little gulls on passage through the Greater Wash SPA may be also be utilizing Hornsea Mere for roosting and feeding. Further data is needed.

Site background and geography

The largest natural lake in Yorkshire, Hornsea Mere is the last significant remnant of the once numerous meres and marshes of Holderness in the East Riding of Yorkshire. Hornsea Mere is situated within the Holderness National Character Area, which comprises of rural, low-lying, undulating plains with the broad, shallow valley of the River Hull flowing southwards through the centre towards Hull

Hornsea Mere is a large, shallow freshwater lake on the western edge of the town of Hornsea in East Yorkshire. It has a surface area of about 130 ha and a mean depth of about 1.2 m. The Mere is surrounded by areas of fringing swamp, and its catchment includes grassland, woodland, agricultural land and parts of the town of Hornsea.

The Mere is a Site of Special Scientific Interest (SSSI) in recognition of its conservation interest, which includes aquatic plants, wetland habitats and wintering and breeding bird populations.

It is also a Special Protection Area (SPA) on account of it hosting the European Protected Species *Anas strepera,* the Gadwall (dabbling duck) and Mute Swan *Cygnus olor.*

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 not listed in Annex I of the Wild Birds Directive (Article 4.2)**

During the breeding season (Post Breeding/Moult) the SPA regularly supports:

- **A036 - Mute Swan *Cygnus olor* (non-breeding)**

The Hornsea Mere SPA citation references the 1987/88-1991/92 "in a 5 year period" baseline for mute swan as **189**, representing 1% of the British population.

The 5 year (2009/10-2013/14) Annual Peak Mean Count Data was **176.** (*WeBS 2015*) – **Autumn** 5 year peak mean for the same period was **207**

The 5 year (2012/13 -2016/17) Peak Mean Winter Count was **161.**

Since notification, the annual peak counts of non-breeding mute swan have fluctuated from year to year.

Mute swan can be found all over the mere being able to access most areas of water depth found by neck dipping and up-ending.

Mute Swans comprising one large group have generally loafed on the spit on the Western end of Swan Island. Another group spends a lot of time in Decoy Bay, and in the north and west edges of the mere where areas of winter reed cutting create a temporary short sward close to the water.

In recent years, 70/100 birds frequent Swan Island spit area and over 200 birds are regularly recorded in Decoy Bay.

Some resident birds seem habituated to some human disturbance from boats etc. around Kirkholme point but other parties seek the sanctuary area in Decoy Bay and the generally undisturbed Swan Island spit for loafing.

Generally Mute Swan populations, which had been fairly stable since the 1960s, increased progressively from the mid-1980s to around 2000, when a new plateau was reached. Frost *et al* (2015) - http://app.bto.org/webs-reporting/

During the non-breeding season the SPA regularly supports:

- **A051 - Gadwall *Anas strepera* (non-breeding)**

At the time of SPA designation (1996) the 1987/88-1991/92 5 year peak count of birds was at **210.** This represented 1.8% of the North West European population and 3.6% of the British wintering population.

The 5 year (2009/10 – 2013/14) Peak Mean Winter Count was **173.**
The 5 year (2012/13 -2016/17) Peak Mean Winter Count was **141.**

Since notification, the annual peak counts of non-breeding gadwall have fluctuated widely from winter to winter (see Fig. 1 below), and have fallen below the minimum population threshold on several occasions Gadwall are present within the SPA throughout the year and the site supports both breeding and non-breeding populations. However, it is during the passage and winter periods when migrant gadwall visit

the site in internationally important numbers. Migrants start to arrive in and build up in July and August. Recent Wildfowl Count Data shows that peak numbers can be seen in any month from August-April.

Numbers of Gadwall over-wintering on Hornsea Mere SPA have been decreasing in the medium-term having previously peaked. Consequently, WeBS Alerts have been triggered for the medium-term and the period since designation. Numbers of this species over-wintering in Great Britain have been increasing long term. The trend on the site does not appear to be tracking that of the either the region or the British trend. The declining proportion of the regional numbers supported by this site suggest that site-specific pressures or local variation in use of non-WeBS counted habitat in Holderness (and further afield) may be affecting this species. In conclusion, the contrast between the declining site trend and both the regional and British trends suggests that declining numbers underpinning these Alerts are most likely due to site-specific pressures.

Gadwall generally feed in the shallow margins of the mere or in association with Coot *Fulica atra* and Mute Swan *Cygnus olor* in deeper water. Theft and scavenging of water plants brought to the surface by Coot and Mute Swan allows Gadwall to exploit food resources in these deeper areas of water.

In the winter, up to 95% of the gadwall's diet is made up of submerged aquatic vegetation such as algae, grasses, rushes, sedges, pondweed, and water milfoil, including leaves, stems, roots, and seeds, which this dabbling duck feeds on by up-ending, head-bobbing and by stealing from other birds such as coots. As a result, gadwall favour expanses of shallower water, rich in submerged macrophytes, where there is little or no human disturbance.

Gadwall regularly frequent the north side of Kirkholme Point (see Map 2) and westwards towards Swan Island. Counts of over 100 birds are regular in this area. They also favour the south side of the mere off Southorpe/Snipe ground, feeding extensively in the shallows.

Decoy Bay also holds good numbers of Gadwall.

Up to date bird numbers may be available from www.bto.org/webs

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
Gadwall	*Non-breeding*	*Winter*													Includes analysis of data from SPA's WeBS Counts up to 2016 (available from BTO)
Mute Swan	*Non-breeding*	*Summer/ Passage*													Includes analysis of data from SPA's WeBS Counts up to 2016 (available from BTO)

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: A036 Mute swan *Cygnus olor* (Post Breeding/Moult)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Non-breeding population	**Population abundance**	Maintain the non-breeding population of mute swan to a level which is consistently above **189 individuals,** whilst avoiding deterioration from current levels, as indicated by the latest 5-year autumn peak count or equivalent. The 1987/88-1991/92 5 year peak count baseline was **189 individuals,** representing 1% of the British population.	Monitoring of this attribute will assess if the site's population is being sustained and its contribution 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. The Hornsea Mere SPA citation references the 1987/88-1991/92 "in a 5 year period" baseline as **189**, representing 1% of the British population. The 5 year (2009/10 – 2013/14) (*WeBS 2015*) – **Autumn** 5 year peak mean for the same period was **207** 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.	Hornsea Mere Wetland Bird Survey – WeBS Counts are available from British Trust for Ornithology (BTO). *http://app.bto.org/webs-reporting/*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. 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. In general, Mute Swan populations, which had been fairly stable since the 1960s, increased progressively from the mid-1980s to around 2000, when a new plateau was reached. On the citation it does state that it is the post-breeding and moulting population that is the feature. We can be confident that to support the initial classification these figures from that period were used so the 189 figure seems to be a reasonable baseline to use. The citation does refer to a mean of peak counts across the 5 years. **In terms of the most recent 5 years the post-breeding/moult period should be used for comparison with the baseline rather than the winter period.**	
Supporting habitat (both within and outside the SPA):	**Extent and distribution of supporting non-breeding habitat**	Maintain the extent and distribution of suitable habitat within the site boundary which supports the feature for all necessary stages of the non-	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 of mute swan. The information available on the extent and distribution of supporting habitat used by the feature may be approximate	Open Water hectare figure from SSSI citation.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
extent and distribution		breeding period (moulting, roosting, loafing, feeding) Mute Swan use the extensive shallows of Hornsea Mere for feeding, as well as the margins of reedbeds and the mere's islands for loafing. **132 ha Open water**	depending to the nature, age and accuracy of data collection.	
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 (www.apis.ac.uk).	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 noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development.	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk). Critical loads for Hornsea Mere SPA can be found here http://www.apis.ac.uk/srcl/select-a-feature?site=UK9006171&SiteType=SPA&submit=Next See Table 3 explanatory notes.
Supporting habitat (both within and outside the SPA): function/ supporting	**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	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	Natural England (2014) Hornsea Mere SPA Site Improvement Plan English Nature (2005) Hornsea Mere – Views About Management

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
process		its supporting habitats. Open areas associated with the Western Spit of Swan Island should be maintained as favoured loafing areas. Birds are also known to use areas of cut reed adjacent to the open water of the mere for feeding and loafing. Areas of this habitat should be created as part of the reed cutting rotation.	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 key current conservation and management measures are: Improve water quality to safeguard aquatic plant communities, in-line with SSSI objectives At Hornsea Mere maintaining areas of largely undisturbed, water plant rich feeding areas is important in safeguarding the supporting habitat for mute swan. Key loafing areas, especially on swan island spit should be maintained and kept open if scrub encroachment is dominating open areas.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Restore a high cover/abundance of preferred food plants (e.g. *Charophytes, Potamogeton, Callitriche, Myriophyllum*). See WQ targets above for interaction with plant communities.	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.	See EA National Contract (UCL) Hornsea Mere Plant Survey data 2004, 2009, 2011, 2014 – available on request
Supporting habitat (both within and outside the SPA): function/ supporting process	**Supporting habitat: Adaptation and resilience**	Maintain the feature's ability, and that of its supporting habitats, to adapt or evolve to wider environmental change, either within or external to the site	This attribute recognises the increasing likelihood of natural habitat features absorbing or adapting to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments (NBCCVAs) for SACs and SPAs in England Available at http://publications.naturalengland.org.uk/publication/4954594591375360

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The overall vulnerability of this particular SPA to climate change has been assessed by Natural England as being low (Natural England, 2015) taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required.	
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water depth**	Maintain the availability of standing water of optimal depth, typically <1 m deep, over at least 50% of the total standing water area.	This feature is known to require extensive areas of water in which to feed. The depth of water at critical times of year may be paramount for successful feeding and therefore their fitness and survival.	Bathymetric Map in CEH (2010) *An assessment of nutrient sources and water quality improvement measures in Hornsea Mere* is available to act as baseline.
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water quality/ quantity**	Where the supporting habitats of the SPA feature are dependent on surface water ensure water quality and quantity is restored to a standard which provides the necessary conditions to support the feature **Hornsea Mere** Lake type = high alkalinity, eutrophic. Depth <3m = shallow **Total phosphorus (TP)** target/limit = 50ug P L^{-1} **Total Nitrogen (TN)** (in mg/l) 0.8mg/l as an annual mean **pH** Stable pH/ANC values appropriate to	For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing, 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. Further site-specific investigations may be required to establish appropriate standards for the SPA. WQ targets are aligned with those for Hornsea Mere SSSI Mute swan are largely vegetarian and could be affected by significant changes to aquatic plant communities affected by water quality changes.	See EA routine monitoring data for info. NE can also supply previous WQ survey work data collected at Hornsea Mere. A Diffuse Water Pollution Plan for Hornsea Mere SSSI is also available. Bathymetric Map in CEH (2010) An assessment of nutrient sources and water quality improvement measures in Hornsea Mere Water Quality targets for Hornsea Mere SSSI are set out in the Favourable Condition Table for the SSSI. Document may be available from Natural England upon request.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		lake type. As a guide, generally pH >7.00 and <9.00 **Chlorophyll** Annual mean chlorophyll - high ecological status at less than 9ug/l		
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 roosting, foraging, feeding, moulting and/or loafing birds so that the feature is not significantly disturbed. General disturbance levels should not increase. Proposals will be assessed on a case by case basis.	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. Low level disturbance is restricted to the summer months when consented boating, sailing and fishing activity is restricted to the Kirkholme Point area. The sanctuary area in Decoy Bay is safeguarded through signage and wardening.	Wassand Estate Warden per comms. And Adviser knowledge. Natural England (2014) Hornsea Mere SPA Site Improvement Plan
Version Control: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 2: Supplementary Advice for Qualifying Features: A051. Gadwall *Anas strepera* (Non-breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Non-breeding population	**Population abundance**	Restore the size of the non-breeding population to a level which is above the population-size included on the SPA Citation, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. At the time of SPA designation (1996) the 1987/88-1991/92 5 year peak count of birds was at **210.** This represented 1.8% of the North West European population and 3.6% of the British wintering population.	Monitoring of this attribute will assess if the site's population is being sustained and its contribution 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 migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede	*Frost et al (2015) - http://app.bto.org/webs-reporting/*

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. 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. Numbers of Gadwall over-wintering on Hornsea Mere SPA have been decreasing in the medium-term, having previously peaked. Consequently, WeBS Alerts have been triggered for the medium-term and the period since designation. Numbers of this species over-wintering within North East Region have been increasing long term. Numbers of this species over-wintering in Great Britain have been increasing long term. The trend on the site does not appear to be tracking that of the either the region or the British trend. The declining proportion of the regional numbers supported by this site suggest that site-specific pressures or local population use of non-WeBS counted wetlands may be affecting this species. In conclusion, the contrast between the declining site trend and both the regional and British trends suggests that declining numbers underpinning these Alerts are most likely due to site-specific pressures. The 5 year (2009/10 – 2013/14) Peak Mean Winter Count was **173.** The 5 year (2012/13 -2016/17) Peak Mean Winter Count was **141.**	
Supporting habitat	**Extent and distribution of**	Maintain the extent and distribution of suitable habitat	Conserving or restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and	Figures from SSSI Favourable Conservation Table (FCT).

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(both within and outside the SPA): extent and distribution	**supporting non-breeding habitat**	(either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding) Gadwall use the extensive shallows of Hornsea Mere for feeding, as well as the margins of reedbeds and the mere's islands for loafing. 132 ha Open water	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 may apply to supporting habitat which also lies outside the site boundary.	Document may be available from Natural England upon request.
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 (**www.apis.ac.uk**).	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 noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development.	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (**www.apis.ac.uk**). Critical loads for Hornsea Mere SPA can be found here

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
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. Open areas associated with the Western Spit on Swan Island should be maintained as favoured loafing areas. Birds are also known to use areas of cut reed adjacent to the open water of the mere for feeding and loafing. Areas of this habitat should be created as part of the reed cutting rotation.	Active and ongoing conservation management is often needed to protect, maintain or restore the wetland and aquatic habitats used by gadwall at Hornsea Mere. 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 key current conservation and management measures are: Maintain low levels of disturbance to SPA birds Improve water quality to safeguard aquatic plant communities, in-line with SSSI objectives At Hornsea Mere maintaining areas of largely undisturbed, water plant rich feeding areas is important in safeguarding the supporting habitat for Gadwall. Key loafing areas, especially on swan island spit should be maintained and kept open if scrub encroachment is dominating open areas.	Natural England (2014) Hornsea Mere SPA Site Improvement Plan English Nature (2005) Hornsea Mere – Views About Management
Supporting habitat (both within and outside the SPA): function/ supporting process	**Food availability within supporting habitat**	Maintain a high cover/abundance of preferred food plants (e.g. Creeping bent *Agrostis stolonifera*, Stoneworts *Chara*, Pondweeds *Potamogeton*, Hornworts *Ceratophyllum spp.).* See Water Quality Targets above.	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.	See EA National Contract (UCL) Hornsea Mere Plant Survey data 2004, 2009, 2011, 2014 – available on request
Supporting habitat (both within and outside the SPA): function/ supporting	**Water depth**	Maintain the availability of standing water of optimal depth, typically <0.25 m deep, over at least 50% of the total standing water area.	This feature is known to require extensive areas of water in which to feed. The depth of water at critical times of year may be paramount for successful feeding and therefore their fitness and survival. Areas of greater than 0.25m depth can be utilised by Gadwall due to their feeding relationship with coot and mute swan. Any	Bathymetric Map in CEH (2010) An assessment of nutrient sources and water quality improvement measures in Hornsea Mere Further details of water level

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
process			assessment of potential impacts of water level change should include and make reference too known population trends of these species and the ability of Gadwall to interact with them.	management will be outlined in the developing Water Level Management Plan led by East Riding of Yorkshire Council (ERYC).
Supporting habitat (both within and outside the SPA): function/ supporting process	**Water quality/ quantity**	Where the supporting habitats of the SPA feature are dependent on surface water ensure water quality and quantity is restored to a standard which provides the necessary conditions to support the feature **Hornsea Mere** Lake type = high alkalinity, eutrophic. Depth <3m = shallow **Total phosphorus (TP)** target/limit = 50ug P L^{-1} **Total Nitrogen (TN)** (in mg/l) 0.8mg/l as an annual mean **pH** Stable pH/ANC values appropriate to lake type. As a guide, generally pH >7.00 and <9.00 **Chlorophyll** Annual mean chlorophyll - high ecological status at less than 9ug/l	For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can adversely affect the availability and suitability of breeding, rearing, 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. Further site-specific investigations may be required to establish appropriate standards for the SPA. WQ targets are aligned with those for Hornsea Mere SSSI Gadwall are largely vegetarian and could be affected by significant changes to aquatic plant communities affected by water quality changes.	See EA routine monitoring data for info. NE can also supply previous WQ survey work data collected at Hornsea Mere. A Diffuse Water Pollution Plan for Hornsea Mere SSSI is also available. Bathymetric Map in CEH (2010) An assessment of nutrient sources and water quality improvement measures in Hornsea Mere Water Quality targets for Hornsea Mere SSSI are set out in the Favourable Condition Table for the SSSI. Document may be available from Natural England upon request.
Supporting habitat (both within and outside	**Minimising disturbance caused by human**	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing	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	Wassand Estate Warden per comms. And Adviser knowledge. Natural England (2014) Hornsea

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
the SPA): minimising disturbance	**activity**	birds so that the feature is not significantly disturbed. Increased levels of disturbance could be a significant threat to SPA bird populations at Hornsea Mere.	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. Boating activity is restricted to the Kirkholme Point area and the sanctuary area in Decoy Bay is safeguarded through signage and wardening.	Mere SPA Site Improvement Plan .
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

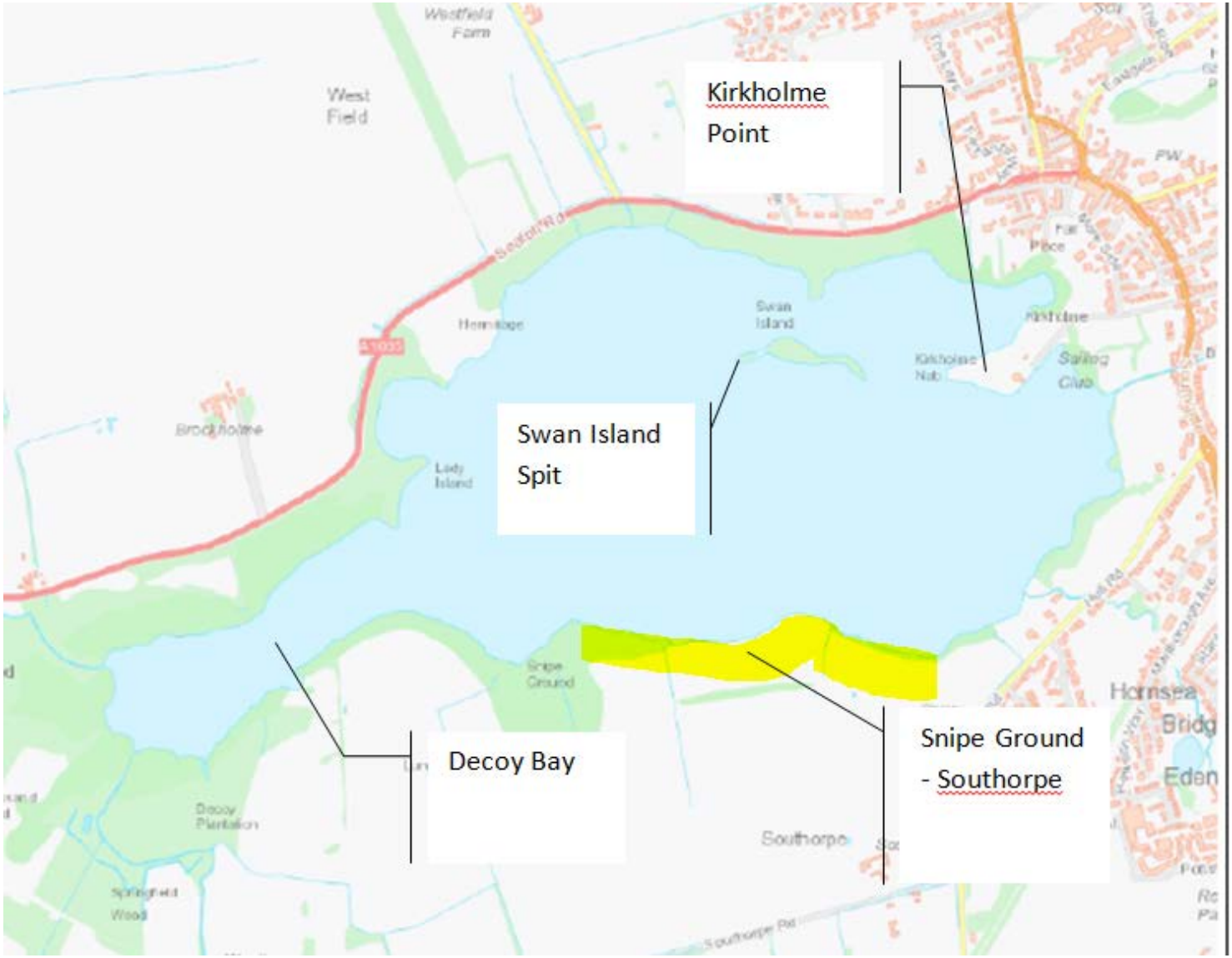
Table 3: Supporting and explanatory notes

Attribute	Supporting and Explanatory Notes
Population: Abundance (individual species)	Monitoring of this attribute will assess if the site's population is being sustained and its contribution 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. 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. Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts. At the time of classification of the SPA the baseline non-breeding population was based on the 5-yr mean peak count. 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.
Supporting habitat: Extent and distribution	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 may apply to supporting habitat which also lies outside the site.
Supporting habitat: Conservation measures	Active and ongoing conservation management is often needed to protect, maintain or restore the feature/s 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.
Supporting habitat: Water quality /	For many SPA features which are dependent on wetland habitats supported by surface water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year during key stages of their life cycle. Poor water quality and inadequate quantities of water can

Attribute	Supporting and Explanatory Notes
quantity	adversely affect the availability and suitability of breeding, rearing, feeding and roosting habitats. Typically, meeting the surface water 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. Further site-specific investigations may be required to establish appropriate standards for the SPA.
Supporting habitat: Air quality	The structure and function of habitats which support this SPA feature may be sensitive to changes in air quality. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. 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. However, there are no Critical Loads assigned to the aquatic systems which are present at Hornsea Mere. Hornsea Mere is Nitrogen limited (N) and air pollution impacts may be masked by other sources of N, i.e. discharges to water, diffuse agricultural pollution etc. There are also 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.
Supporting habitat: Anthropomorphic disturbance	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.
Supporting habitat: Connectivity	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.
Supporting habitat: Adaptation and resilience	This attribute recognises the increasing likelihood of natural habitat features absorbing or adapting to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.

Attribute	Supporting and Explanatory Notes
	The overall vulnerability of this particular SPA to climate change has been assessed by Natural England as being low (Natural England, 2015) taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required.
Supporting habitat: Water depth	Mute Swan and Gadwall are known to require extensive areas of water in which to feed. As a result, the depth of water at critical times of year is paramount for successful feeding and therefore their fitness and survival.
Supporting habitat: Food availability	The availability of an abundant food supply is critically important for 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 food plants may adversely affect the population.

Map.1 – Detailed Locations Mentioned in Text



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