Definition of Favourable Conservation Status for Great Cormorant, *Phalacrocorax carbo*

Defining Favourable Conservation Status Project

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About the DFCS project

Natural England's Defining Favourable Conservation Status (DFCS) project is defining the minimum threshold at which habitats and species in England can be considered to be thriving. Our FCS definitions are based on ecological evidence and the expertise of specialists.

We are doing this so we can say what good looks like and to set our aspiration for species and habitats in England, which will inform decision making and actions to achieve and sustain thriving wildlife.

We are publishing FCS definitions so that you, our partners and decision-makers can do your bit for nature, better.

As we publish more of our work, the format of our definitions may evolve, however the content will remain largely the same.

The document *Defining Favourable Conservation Status in England* describes the methodology used by Natural England to define FCS.

1. Introduction

This document sets out Natural England's view on Favourable Conservation Status (FCS) for **Great Cormorant, *Phalacrocorax carbo*** in England. Favourable conservation status is defined in terms of three parameters: natural range and distribution; population; extent and quality of habitat necessary for long-term maintenance of populations.

Section 2 provides the summary definition of favourable conservation status in England. Section 3 covers contextual information, section 4 the metrics used and section 5 describes the evidence considered when defining favourable conservation status for each of the three parameters. Section 6 sets out the conclusions on favourable values for each of the three parameters. Annex 1 lists the references.

This document does not include any action planning, or describe actions, to achieve or maintain favourable conservation status. These will be presented separately, for example within strategy documents.

2. Summary Favourable Conservation Status Definition

2.1 Favourable Conservation Status in England

FCS parameter	Favourable status	Confidence
Range and distribution	Cormorants in England comprise of two subspecies. A long-established coastal breeding population belongs to the subspecies *carbo* and from 1981 when a colony of the continental subspecies *sinensis* was established at Abberton reservoir in Essex, the development of an inland tree-nesting population. Outside the breeding season, England supports cormorants from breeding colonies in Wales and Scotland, and from continental Europe. Because the conservation status and threats to breeding *carbo* and *sinensis* in England differ, we consider FCS at the subspecies level, where possible. Coastal breeding distribution: The distribution and number of coastal colonies is believed to have remained fairly stable between the late 1960s and the last census in 1999-2002 at c. 55 colonies, with most colonies in the south-west, and a smaller number in south, north-east and north-west England. Because licensed control is believed to be the main threat to coastal breeding cormorants, and that the policy relating to the licensing of cormorants in England was revised in 2004, to increase the maximum permitted number of birds shot each year from 570 to 2000, we define Favourable Conservation Status as one in which the number of colonies does not fall below the number of colonies recorded in 2004. We do not have a robust estimate of the number of colonies in 2004, and so instead use the closest estimate for 1999-2002, which is 55 colonies. Inland breeding distribution: Recent colonisation and range expansion of the inland breeding population has been unprecedented. Whilst it is difficult to define a favourable range for inland breeding cormorants, we use the same justification as above to define Favourable Conservation Status as one in which the number of inland colonies does not fall below 36 colonies recorded in 2004. Inland and coastal wintering distribution: For the wintering population, we have an existing system of alerts which can be used. Here we define Favourable Conservation Status as one in which population decline of cormorants at important SPA and SSSI's for cormorants does not exceed 25% in the short, medium or long-term as defined by the WeBS alerts.	**Moderate**
Population	Coastal breeding population size: Estimates for the coastal breeding population in England, suggest that the population remained stable over the period 1986-2000 at about 1,300 apparently occupied nests (AON's). Using the same justification above, we define Favourable Conservation Status as one in which the coastal population size	**Moderate**

	does not fall below the number recorded in 2004. The closest estimate that we have is for 1999-2002, which is 1,315 AON's. Inland breeding population size: As above we define Favourable Conservation Status for inland breeding cormorants as one in which the inland breeding population does not fall below 2,126 AON's in 2004. Inland and coastal wintering population size: We define Favourable Conservation Status as one in which the wintering population of cormorants does not fall below 30,965 individuals recorded during the winter of 2004/05.	
Habitat	Coastal breeding cormorants are largely restricted to nesting and over-night roosting on cliffs, stacks and offshore islands. It is unlikely that the availability of suitable habitat for coastal cormorants will change or has changed in recent years, although habitat quality may be influenced by the level of predation, disturbance or food availability. For cormorants making use of inland sites, still-waters that have islands with trees are particularly important for breeding. There are more sites used as night roosts than breeding colonies, which suggests that there is suitable habitat that could support a larger inland breeding population. Food availability is also unlikely to be limiting on inland waters. Habitat quality would be difficult to measure directly, but indirect impacts through reduced survival or productivity of cormorants could be used as indicators of change in habitat quality if monitoring of these were improved.	**Moderate**

3. Species definition and ecosystem context

3.1 Species definition

Great Cormorant *Phalacrocorax carbo*

Subspecies: *Phalacrocorax carbo carbo and Phalacrocorax carbo sinensis*

Coastal breeding great cormorants (hereafter cormorants) in England are believed to be exclusively of the nominate subspecies *P.c.carbo.* Before 1981, the cormorant in England rarely attempted to breed other than on coastal cliffs, stacks and offshore islands.

The establishment of a tree-nesting colony at Abberton reservoir in Essex in 1981 was followed by colony growth and the establishment of new inland colonies elsewhere. This population is thought to have been founded by cormorants of the continental subspecies *P.c.sinensis* mainly from the Netherlands and Denmark, although an unknown proportion of nominate subspecies *carbo* originating from coastal colonies in Wales and England are believed to have contributed to the development of the Abberton colony.

Outside the breeding season, England supports cormorants from a number of breeding populations. These include coastal breeding *carbo* mainly from England and Wales, *sinensis* from continental Europe, and both subspecies from the inland-breeding populations in England. Because of the difficulties in separating the two subspecies in the field, we do not know the extent to which different subspecies contribute to the wintering population in England, and whether the importance of different breeding populations outside the breeding season varies spatially. The table below provides a comparison between *P. c. carbo* and *P. c. sinensis*.

	P.c.carbo	*P.c.sinensis*	Source
Historical status	Native, long-established sub-species	Native, breeding from 1981	[1]
Breeding habitat	Mainly coastal cliffs, stacks and on offshore islands.	Trees on islands or along undisturbed margins of inland waters	[1]
Wintering habitat	Inland and coastal waters	Inland and coastal waters	[2]
Timing of breeding	Mean hatch date 26th May	Mean hatch date 27th April	[3]
Productivity	2.1 chicks fledged per pair	2.6 chicks fledged per pair	[3]
Survival	1st year survival - 44%	1st year survival - 58%	[4, 5]
	2nd year survival - 75%	2nd year survival - 88%	
	Adult survival - 85%	Adult survival - 88%	
Movements	Sedentary or partially migratory	Migratory	[2]

[1] Newson and others 2007; [2] Wernham and others 2002; [3] Newson and others 2005; [4] Wernham & Peach 1999; [5] Frederiksen & Bregnballe 2000a, b.

Whilst increases in cormorants may be regarded as favourable from a conservation viewpoint, increasing numbers of cormorants are widely believed by fishery managers and anglers to have an adverse effect on fish (most notably on introduced fish) stocks and thus the interests of fisheries, driven by depredation of coarse fish and salmonids, wounding of fish (which may then die or be unmarketable), and behavioural changes caused by cormorants, thus potentially reducing availability to anglers. There is considerable disagreement as to the extent and impact of cormorants on fishery interests, but in 2004, the policy relating to the licensing of cormorants in England was revised with the intention of making the licensing system more accessible for those arguing a genuine need to obtain a licence. The new policy increased the potential number of birds shot each year from 570 to 2000 (with the flexibility to increase this up to 3000 for short periods). In 2021, Defra clarified its policy so that Natural England has responsibility for setting a prudent upper limit to ensure that licensed removal does not irreversibly affect the conservation status of cormorants. Natural England will use this definition of conservation status to inform decisions on the upper limit for licensing.

Sources: *Mitchell and others 2004; Newson and others 2004; Newson and others 2007; Smith and others 2008; Wernham and others 2002.*

3.2 Species status

Red list status

Conservation status and an assessment of the risk of extinction.

- **Global**: **IUCN Red List** Least Concern *https://www.iucnredlist.org/species/22696792/132592923*
- **European: European Red List, IUCN** Least Concern, increasing.
- **GB: Birds of Conservation Concern 4:** Green List (Eaton and others 2015)
- **GB:** IUCN: Least Concern

3.3 Life cycle

Cormorants have an extended breeding season, generally occupying their breeding colonies from mid-March to mid-September, but with earlier arrival and earlier onset of breeding at inland colonies.

Coastal breeders of all ages may remain in the vicinity of the breeding colonies year-round. Many disperse widely, with a significant proportion moving inland and with some moving as far as northern France and Iberia. Immature birds tend to move further than adults.

Birds from inland breeding colonies in England tend to move further than coastal breeders. Whilst many individuals remain in England, they may move considerable distances and there are many recoveries of ringed birds from the Netherlands and France, and smaller numbers from Iberia and Tunisia.

Some continental birds move into England during the winter, during which wintering numbers are further boosted by individuals originating from coastal breeding colonies in Wales and Scotland. There is evidence from ringing data that there has been a behavioural shift from about

the mid-1970s, for coastal breeding *carbo* in the UK to make increasing use of inland waters during the winter.

Sources: *Hughes and others 1999a; Newson and others 2007; Wernham and others 2002.*

3.4 Supporting habitats

Cormorants are traditionally associated with the coast, where they require areas of shallow water for feeding, and sea cliffs, offshore stacks and islands for breeding.

Whilst small numbers of cormorants have historically occurred inland, the number of breeding and non-breeding individuals found on inland waters, particularly in southern England, has increased since the 1980s. This increase is thought to be associated with a decrease in human persecution, following legal protection first on the continent and, more recently, in England under the Wildlife & Countryside Act of 1981, and an increase in the extent of suitable inland habitat. Suitable inland habitat includes reservoirs and gravel pits, particularly where there are islands with trees which provide safe opportunities for roosting and breeding. Up to 2005, a total of 58 inland colonies have held successful breeders and just two have been at sites along rivers. Shallow inland waters are often stocked with high densities of fish, providing a rich supply for foraging birds.

The importance of food availability has not been investigated directly in cormorants, although a relationship between the increase in the number of cormorant pairs in colonies in Denmark and the area of available feeding habitat within 20 km has been demonstrated. In comparison, there is probably a less predictable and less abundant food supply in the marine environment.

Sources: *Brown & Grice 2005; van Eerden & Gregersen 1995; Hughes and others 1999b; Newson and others 2007.*

3.5 Ecosytem context

Great cormorants have a wide geographical range with a discontinuous distribution from NW Europe, through Asia and Africa to Australasia, but the species is absent from South America and most of North America. The species is polytypic with 5 recognised subspecies.

The global population is estimated to be c.1,367,000-2,063,000 individuals. A Pan-European census of breeding cormorants in 2006 by Wetlands International estimated there to be about 284,500 breeding pairs in Europe (within the EU-27 region and Norway and Switzerland combined), with a total of 52,143 pairs of *carbo* and 232,311 pairs of *sinensis*.

A Pan-European census of wintering cormorants, (including non-breeding individuals) estimated the population to be c. 134,000 *carbo* and c. 427,000 *sinensis*. This is likely to include individuals originating from breeding populations outside the EU.

England supports around 4% of the European breeding population of *carbo*, and <1% of the European breeding population of *sinensis*. During the winter, England is estimated to support about 6% of the European wintering population of cormorants, although the proportional contribution of *sinensis* and *carbo* is unknown.

Sources: *Birdlife International 2015; Del Hoyo and others 1992; Wetlands International 2019*

4. Metrics

4.1 Natural range and distribution
Breeding distribution: The number and distribution of *carbo* coastal colonies and (predominantly) *sinensis* inland colonies. Wintering distribution: The distribution and status of important SPAs and SSSIs for wintering cormorants derived from BTO/RSPB/JNCC Wetland Bird Survey data (WeBS hereafter), which is collected in association with the WWT Wetland Bird Survey.
4.2 Population
Breeding population size: The number of Apparently Occupied Nests (AON) as described in Mitchell and others (2004) for *carbo* coastal colonies and (predominantly) *sinensis* inland colonies. Wintering population size: Population estimates for wintering cormorants derived from WeBS counts and Dispersed Waterbird Survey data.
4.3 Habitat for the species
Hectares or km squares are likely to be most useful.

5. Evidence

5.1 Current situation

Natural range and distribution

Inland breeding distribution: The last complete census of inland breeding cormorants in England was carried out in 2012 as part of a pan-European census proposed as part of the EU CORMAN initiative and coordinated by the Wetlands International Cormorant Research Group (Bregnballe and others 2014). It is thought that there were 49 inland colonies at this time in England, with most colonies in the south-east and central England.

The table below, updated from that in Bregnballe and others (2014), provides a county level breakdown of the number of inland colonies and apparently occupied nests in England in 2012.

County	No. colonies	AONs		County	No. colonies	AONs
Bedfordshire	2	29		Middlesex	2	67
Berkshire	3	32		Norfolk	2	133
Buckinghamshire	1	23		North Yorkshire	1	12
Cambridgeshire	4	222		Northamtonshire	3	55
Cumbria	1	16		Oxfordshire	1	53
Derbyshire	2	98		Rutland	1	67
East Sussex	3	249		Somerset	2	20
Essex	3	432		Staffordshire	1	52
Gloucestershire	1	6		Suffolk	1	97
Hertfordshire	2	43		Warwickshire	1	28
Kent	3	218		West Yorkshire	1	80
Leicestershire	2	27		Wiltshire	1	2
Lincolnshire	1	8		Middlesex	2	67

Coastal breeding distribution: The last complete census of coastal colonies in England was carried out in 1998-2002 as part of Seabird 2000 (Mitchell and others 2004). Most of the 59 coastal colonies recorded were in the south-west of the country, with the remainder in south, north-east and north-west England.

The table below, adapted from Mitchell and others (2004), provides a county level breakdown of the number of coastal colonies and apparently occupied nests in England from Seabird 2000 (1998-2002).

County	No. colonies	AONs		County	No. colonies	AONs
Avon	1	72		East Sussex	1	2
Cleveland	3	68		Isles of Scilly	5	56
Cornwall	25	199		Isle of Wight	1	90
Cumbria	2	80		Northumberland	2	144
Devon	13	181		North Yorkshire	2	25
Dorset	3	150		Tyne & Wear	1	248

Inland and coastal wintering distribution: In winter cormorants are widely distributed throughout England, with lower densities in the uplands and higher densities along the coasts, particularly around larger estuaries, and along major lowland rivers systems (Balmer and others 2013). Locations supporting the highest numbers in recent years include the north-west estuaries, Dungeness and Stodmarsh in Kent, the Norfolk Broads and Abberton Reservoir in Essex. The WeBS alerts process assesses the change in numbers over short-, medium- and long-term periods (5, 10 and up to 25 years respectively). Alerts for cormorants are only currently assessed for two SPAs in England, Abberton reservoir and Ouse Washes. Whilst these are not official alerts, the equivalent percent change in SPAs and SSSIs on which cormorants occur or have occurred in sufficient numbers is used to generate a trend. This is helpful because it indicates locations where cormorant numbers have not been maintained (Annex 2 provides a breakdown by SPA and SSSI of the population change of cormorants).

Population

Inland breeding population size: The last complete census of inland breeding cormorants in 2012 produced an estimate of 2,348 AONs (Bregnballe and others 2014), amounting to a 7% increase in the 7 years since the previous census in 2005 (Newson and others 2007). Whilst numbers at some of the larger, longer-established colonies decreased, new colonies had been established elsewhere, with consequent range-expansion.

Coastal breeding population size: There is no more recent estimate of the coastal *carbo* breeding population since 1998-2002, when it was estimated to be 1,315 AONs (Mitchell and others 2004).

Inland and coastal wintering population size: The last published estimate of the English wintering population is 32,786 individuals (31,355-34,931 individuals) for the winter of 2014/15. This was produced using a combination of WeBS and Dispersed Waterbird Survey data (after Chamberlain and others 2013). For the purposes of this definition, an updated population estimate for England was produced for 2017/18 of 37,257 individuals, by extrapolating the last population estimate for 2014/15 to 2017/18 based on the population change between these derived from WeBS data (BTO unpublished data).

Habitat for the species

Inland habitat requirements: Cormorants require inland waters with islands or undisturbed margins with trees within which to roost at night during the winter, and during the breeding season within which to nest. The extent of suitable foraging habitat for cormorants is restricted to areas of shallow inland water of less than 10-meters in depth.

Coastal habitat requirements: At the coast, suitable night roosts and nesting habitat typically comprises sea cliffs, stack and offshore islands. As with inland cormorants, foraging habitat is restricted to areas of shallow coastal and inland water of less than 10-meters in depth.

Sources*: Balmer and others 2013; Bregnballe and others 2014; Chamberlain and others 2013; Hughes and others 1999b; Newson and others 2007.*

Confidence: *Moderate*

5.2 Historical variation in the above parameters

Natural range and distribution

Inland breeding distribution: There is evidence for inland breeding by cormorants at a minimum of six sites up to the 1940s. It is possible that cormorants bred more widely inland prior to the drainage of wetlands. Whilst we do not know if cormorants would have used the marshy habitats that may have dominated wetlands in the past, as much as 25% of the UK was covered by wetlands before Roman times (Rackham 1986) and suitable pools, meres and lakes may have been widespread. By the 1980s, wetlands covered just 5% of the UK landscape. Furthermore, intense persecution may have restricted the distribution of cormorants to the coast. Growing concerns for relatively small populations of continental *sinensis* during the twentieth century led to protective legislation being introduced, first in The Netherlands (1965) and Denmark (1971), and then widely throughout Europe under Annex 1 of the EC Birds Directive (1979). Protective legislation for both European subspecies, *carbo* and *sinensis*, was introduced to Britain under the Wildlife and Countryside Act (1981). An inland tree-nesting colony became established at Abberton reservoir in Essex in 1981. It grew rapidly, with birds from this colony being involved in the establishment of new inland colonies elsewhere in eastern England (Newson 2000) and since 1981, breeding has been recorded from 89 inland sites in England, with a maximum of 49 colonies occupied in any one year up to 2012 (Bregnballe and others 2014).

Coastal breeding distribution: The first comprehensive survey of coastal colonies was undertaken in 1969-70, the English total number of colonies then being about 60 colonies. Repeat surveys in 1985-88 and 1998-2002 indicated that there were about 50 and 55 colonies. During this time, the loss of colonies in some areas (for example, in Northumberland), has largely been offset by the establishment of others (for example, in Cumbria and Co. Durham) but the overall range has remained much the same.

Wintering distribution: Between the 1981-84 Winter Atlas and the 2007-2011 Breeding and Wintering Atlas there has been a 53% range expansion of wintering cormorants in Great Britain (Balmer and others 2013). There is only anecdotal information on the distribution of cormorants prior to the 1980s, but records suggest that wintering numbers inland at least were at a low level before this time.

Population

Inland breeding population size: Inland breeding is not a recent phenomenon and there is evidence of inland breeding dating back to the 16th century. The first documented record of inland tree-nesting by cormorants in England occurred in East Anglia during the 1540s (Coward 1928). Until the 1940s, inland breeding had been reported from just six sites, in Cumbria, Dorset, Kent, Norfolk (two) and Suffolk (Newson and others 2006). At several of these sites, human persecution is thought to have curtailed breeding activity, but little information is available on historical persecution levels. After the establishment of a colony at Abberton reservoir in 1981, the breeding population at Abberton grew rapidly from nine to 310 pairs in 1989 (Newson and others 2006). From 1989 to 1994, when growth of the colony at Abberton was showing signs of slowing, a further eight colonies were established in England. A further 39 colonies were established by 2012, with an overall inland population size of 2,348 AONS (Bregnballe and others 2014).

Coastal breeding population size: The first comprehensive counts of coastal colonies were undertaken in 1969-70, the English total then being 1,191 AONS. Before this time, there is very little, even anecdotal information to infer anything about population size. Repeat surveys in 1985-88 and 1998-2002 indicated populations of around 1,220 and 1,315 AONS respectively. During this time, losses in some areas (for example, declines in Northumberland) have been offset by increases in others (for example, increases in Cumbria and Co. Durham).

Wintering population: The wintering population in England was estimated from WeBS and Dispersed Waterbird Survey data to be 21,899 (20,055-24,125) individuals in 1988/89 and increased to an estimated 32,786 individuals (31,355-34,931 individuals) by the winter of 2014/15. The current extrapolated winter estimate of 37,257 individuals for the winter of 2017/18 is a bit higher, but more generally the wintering population has remained fairly stable since 2005/06 at about 30,000 individuals.

Habitat for the species

Inland habitat: Historically, wetlands within England were more abundant and extensive, and so there were probably more natural opportunities for breeding and wintering cormorants in the past. However, a relatively recent and significant increase in the number and extent of artificial inland waters, particularly of reservoirs and gravel pits with islands with trees suitable for use by roosting and breeding birds, and which are often stocked with high densities of fish are likely to have substantially increased opportunities for cormorants inland in recent years.

Coastal habitat: The extent of suitable coastal breeding habitat is likely to be similar in historical times to the present. Whilst coastal fish stocks have negatively impacted several other seabird species, it is not known whether food availability for coastal cormorants has changed over time.

Sources: *Balmer and others 2013; Bregnballe and others 2014; Cramp and others 1974; Holloway 1996; Hughes and others 1999b; Lloyd and others 1991; Mitchell and others 2004; Newson 2000; Newson and others 2006; Rackham 1986.*

Confidence: *Moderate*

5.3 Future maintenance of biological diversity and variation of the species

Current pressures and threats

The main threat to cormorants is probably licensed control, although there will also be some level of (unquantified) unlicensed control, and some potential impact of human disturbance (deliberate or otherwise) at inland breeding colonies and wintering sites. Between 2015/16 and 2018/19, an average of 2,614 cormorants were shot each year during the winter under licence in England. This equates to removing about 7% of the English wintering population annually. We do not know how removing 7% of the English wintering population each year, might affect English coastal breeding cormorants, or other breeding populations. Food availability for coastal breeding cormorants could also be limiting, as shown by lower productivity (chicks fledged per pair) at coastal colonies compared with inland colonies (Newson and others 2005).

Natural range and distribution

Whilst several pressures and threats (discussed above) could impact on cormorant numbers and potentially distribution through reduced survival or productivity, the range of cormorants is

perhaps most constrained by the availability of suitable safe sites for breeding and roosting. It is not expected that the number and distribution of suitable coastal sites will change. Inland, there are additional sites that have been used for roosting, but not as yet for breeding (at least up the last census in 2012), suggesting that the future inland breeding range could be larger.

Population

Being a long-lived species, changes in survival are likely to have the biggest impact on cormorant numbers. Assessing favourable conservation status for coastal breeding cormorants will require updating the current estimates and ongoing monitoring to ensure that any impact of control during the winter does not exceed a critical threshold that would drive the population into long-term decline at coastal colonies. Whilst the work underlying this is now relatively old, there is an interest in coastal breeding cormorants, because age-specific survival and productivity (number of chicks fledged per pairs) has previously been shown to be lower than at inland colonies (Newson and others 2005), and population modelling has shown that small changes in survival or productivity (to a lesser degree) over several years could lead to long-term population decline (Newson 2000).

Habitat for the species

Coastal cormorants are largely restricted to breeding and roosting at night on sea cliffs, stacks and offshore islands. Unless there are changes in the quality of the habitat, through an increase in predators, disturbance or reduced food availability, it is unlikely that the availability of suitable coastal habitat will change. For inland cormorants, more sites are used as night roosts than breeding colonies (at least up to the last census in 2012), suggesting that suitable habitat is available to support a larger inland breeding population. Food availability is also unlikely to be limiting on inland waters whilst current fishery management practices continue. Whilst declines in numbers of birds breeding have been observed at many of the earlier inland breeding colonies to become established, new colonies have become established, and there is likely to be suitable habitat to support the current inland breeding population, possibly at a higher population level.

Sources: *Brown & Grice 2005; Newson 2000; Newson and others 2005.*

Confidence: *Moderate*

5.4 Potential for restoration

Natural range and distribution

There is scope for some restoration of the natural range and distribution to address a loss of colonies in Northumberland, but more generally the range of coastal breeding cormorants has remained fairly constant, at least between 1969/70 and 1998-2002, and is constrained by the availability of suitable cliffs, stacks and offshore islands on which to roost and breed. Coastal cormorants could also benefit indirectly from an increase in offshore structures, which may provide day roosting opportunities. At inland waters, there are potentially more sites that are not currently used for breeding and roosting that could support cormorants, but the current range and distribution of inland cormorants is currently far greater than it has been in the past. There is also scope to reduce the threats to cormorants during the winter at important sites, by using the trends on SPA's and SSSI's as informed by WeBS to inform licensing decisions in the vicinity of these sites.

Population

Restoration of the population is not needed subject to more up to date survey information on coastal breeding birds, which were last surveyed nearly 20 years ago. The coastal breeding population in England is thought to have remained fairly stable between 1969/70 and 2000 at least, at about 1,300 AON's. The inland breeding population increased rapidly from 9 pairs in 1981 to 2,348 AON's in 2012. The wintering population also increased by about 70% from 1988/89 to 2017/18, likely in part due to the growth of the inland breeding population.

Habitat for the species

Habitat restoration is not required. In coastal areas there are likely to be sufficient nesting habitat and feeding areas, and inland, the use of inland waters, including newly created waterbodies, mean that habitat restoration is not needed there.

Sources: Balmer *et al*. 2013; Chamberlain *et al*. 2013; Hughes *et al*. 1999b; Lloyd et al. 1991; Mitchell et al. 2004; WeBS unpublished data.

Confidence: Moderate

6. Conclusions

6.1 Favourable range and distribution

Inland breeding distribution: Whilst cormorants have historically bred inland, we do not know the numbers involved nor the regularity with which they did so. The recent colonisation and range expansion following increased protection of inland breeding sites is thought to be unprecedented. Licensed control is the main threat to cormorants and the policy relating to the licensing of cormorants in England, revised in 2004, increased the number of birds which could be shot each year from 570 to 2000. The 36 colonies present in 2004 are to be taken as the baseline. To be able to measure this in the future, we need improved annual monitoring of inland breeding cormorants. Current information is eight years out of date.

Coastal breeding distribution: As licensed control is the main threat to coastal breeding cormorants, as described above, we define numbers in 2004 as a baseline, below which we do not want to fall below. In the absence of count data, we use the closest estimate for 1998-2002 based on Seabird 2000. Based on past censuses, during which the coastal breeding population changed very little up to 1998-2002 at least, a natural range is defined as there being at least 55 colonies, with colonies in the south-west, south, north-east and north-west England which is taken as favourable conservation status. To measure this in the future, we need improved annual monitoring of coastal breeding cormorants, or a more recent census to determine the current status of coastal breeding cormorants. Current information is twenty years out of date.

Wintering distribution: An increase in the inland breeding population, and a change in behaviour for coastal breeding cormorants from England, and from elsewhere are increasingly making use of inland waters in the winter. We define favourable conservation status as one in which population decline of cormorants at important SPAs and SSSIs for cormorants (sites listed in Annex 2) does not exceed 25% in the short, medium or long-term as defined by the WeBS alerts.

6.2 Favourable population

Inland breeding population size: Because licensed control is likely to be the main threat to cormorants, and the policy relating to the licensing of cormorants in England was revised in 2004 to increase the permitted number of birds to be shot each year from 570 to 2000, we use 2004 as a baseline below which we do not wish numbers to fall, which is 2,126 AONS. To measure this, we need improved annual monitoring. Current estimates are eight years out of date (see section 5.1).

Coastal breeding population size: As with justification above, favourable conservation status requires that the coastal population size in 1998-2002 is maintained at 1,315 AONs. To be able to measure this in the future we need better monitoring of coastal breeding cormorants, or a census to provide an updated estimate of population size. Current estimates are 20 years out of date.

Wintering population: With the justification above, we define favourable conservation status as one in which the wintering population of cormorants does not fall below the baseline of 30,965 individuals recorded during the winter of 2004/05. This value will be used as the reference level for Natural England licensing (it is slightly higher the population average for the period 1996-

2000, estimated to be 29,000 individuals, used by Natural England as the reference value prior to publication of this definition; Heydon, 2008). Change in the wintering population could be measured each year by extrapolating forward the last wintering population estimate 2014/15 using information on population changes derived from the WeBS survey, but a more robust winter estimate should be produced adopting the approach in Chamberlain *et al.* (2014) at regular intervals (for example every five years) to ensure that the annual estimates based on extrapolation are robust.

6.3 Favourable supporting habitat

Favourable conservation status requires that the current area of supporting habitat is maintained, without a significant reduction in habitat quality, through increased predation, disturbance or reduced food availability. Habitat quality would be difficult to measure directly, but indirect impacts through reduced survival or productivity of cormorants could be used as indicators of change in habitat quality, but cormorant monitoring would need to be improved to inform on these.

Annex 1: References

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. Book title: Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland BTO Books, Thetford ISBN: 978-1-908581-28-0.

BirdLife International. 2015. European Red List of Birds. Office for Official Publications of the European Communities, Luxembourg.

Bregnballe, T., Lynch, J., Parz-Gollner, R., Marion, L., Volponi, S., Paquet, J.-Y., David N. Carss & van Eerden, M.R. (eds.) 2014. Breeding numbers of Great Cormorants *Phalacrocorax carbo* in the Western Palearctic, 2012-2013. IUCN-Wetlands International Cormorant Research Group Report. - Scientific Report from DCE – Danish Centre for Environment and Energy No. 99, 224 pp. http://dce2.au.dk/pub/SR99.pdf

Brown, A. & Grice, P. 2005. Birds in England. T&AD Poyser, London.

Chamberlain, D.E., Austin, G.E., Green, R.E., Hulme, M.F. & Burton, N.H.K. 2013. Improved estimates of population trends of Great Cormorants Phalacrocorax carbo in England and Wales for effective management of a protected species at the centre of a human–wildlife conflict. *Bird Study* **60**, 335-344.

Cramp, S., Bourne, W.R.P., & Saunders, D. 1974. *The Seabirds of Britain and Ireland*. Collins, London.

Del Hoyo, J., Elliott, A. & Sargill, J. eds. 1992. Handbook of the Birds of the World. Volume 1: Ostrich to Ducks. Lynx Edicions, Barcelona.

Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. & Gregory, R. 2015. Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

van Eerden, M.R. & Gregersen, J. 1995. Long-term changes in the northwest European population of cormorants *Phalacrocorax carbo sinensis*. *Ardea* 83, 61-79.

Frederiksen, M. & Bregnballe, T. 2000a. Evidence for density-dependent survival in adult cormorants *Phalacrocorax carbo sinensis* at Vorsø, Denmark, from a combined analysis of recoveries and resightings. *Journal of Animal Ecology* 69, 737-752.

Frederiksen, M. & Bregnballe, T. 2000b. Diagnosing a decline in return rate of one year-old cormorants: mortality, emigration or delayed return? *Journal of Animal Ecology* 69, 753-761.

Heydon, M.J. 2008. Licensing the shooting of cormorants to prevent serious damage to fisheries and inland waters: setting the upper limit for the number of cormorants that may be shot under licence. Period: 31 August 2007 and 30 August 2008. Natural England, Sheffield, England. DOI: 10.13140/2.1.2016.8000

Holloway, S. 1996. The Historical Atlas of Breeding Birds in Britain and Ireland: 1875-1900. T&D Poyser, London.

Hughes, B., Bruce, J. Ekins, G.R., & Newson S.E. 1999a. Movement and distribution of inland breeding cormorants in England. WWT Wetlands Advisory service report to English Nature.

Hughes, B., Bevan, R.M., Bowler, J.M., Still, J.M., Carss, D.N., Marquiss, M., Hearn, R.D. & Bruce, J.H. 1999b. Feeding behaviour of fish-eating birds in Great Britain. Department of the Environment Transport and the Regions, London.

Lloyd, C. Tasker,M.L & Partridge, K. 1991. The status of seabirds in Britain and Ireland. T&AD Poyser, London.

Mitchell, P.I. and others (Eds.). 2004. Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002). Published by T and A.D. Poyser, London.

Newson, S.E. 2000. Colonisation and range expansion of inland breeding great cormorants in England. PhD Thesis, University of Bristol.

Newson, S.E., Hughes, B., Russell, I.C., Ekins, G.R. & Sellers, R.M. 2004. Sub-specific differentiation and distribution of Great Cormorants *Phalacrocorax carbo* in Europe. *Ardea* 93, 3-10.

Newson, S.E., Ekins, G.R., Marchant, J.H., Rehfisch, M.M. & Sellers, R.M. 2006. The status of inland and coastal breeding great cormorants *Phalacrocorax carbo* in England. BTO Research Report 433. British Trust for Ornithology, Thetford.

Newson, S.E., Marchant, J.H., Ekins, G.R. & Sellers, R.M. 2007. The status of inland-breeding Great Cormorants in England. *British Birds* 100, 289-299.

Newson, S.E., Hughes, B., Hearn, R. & Bregnballe, T. 2005. Breeding performance and timing of breeding of inland and coastal breeding Cormorants *Phalacrocorax carbo* in England and Wales. *Bird Study* 52, 10-17.

Smith, G.C., Parrott, D. & Robertson, P.A. 2008. Managing wildlife populations with uncertainty: cormorants *Phalacrocorax carbo*. *Journal of Applied Ecology* 45, 1675-1682.

Wernham, C. & Peach, W.J. 1999. Use of ring recoveries to monitor long-term changes in the survival rates of British and Irish cormorants *Phalacrocorax carbo*. In large-scale studies of marked birds. *Proceedings of EURING 97 Technical Conference*. pp189-197.

Wernham, C., Toms, M., Marchant, J., Clark, J., Siriwardena, G, & Baillie, S. 2002. *The Migration Atlas*. T & A.D. Poyser, London.

Wetlands International. 2019. Waterbird Population Estimates. Available at: wpe.wetlands.org. (Accessed: 06/12/2019).

Annex 2

A breakdown by SPA and SSSI of the population change (% change) of cormorants at important wintering sites between 1991/92 and 2016/17, and considered in three periods (short-, medium- and long-term; 5, 10 and up to 25 years respectively) defined according to the alerts process at https://app.bto.org/webs-reporting/.

	Term					Term		
Site	short	medium	long		Site	short	medium	long
Upper Solway Flats and Marshes SPA	-41	-33	-36		Hamford Water SSSI	583	669	1018
Ribble and Alt Estuaries Phase 2 SPA	-25	54	271		Hythe to Calshot Marshes SSSI	16	10	-4
Martin Mere SPA	154	-3	2100		Sandbeach Meadows SSSI	-42	-44	-64
Mersey Estuary SPA	12	81	191		Upper Solway Flats and Marshes SSSI (England)	-41	-38	-44
Lindisfarne SPA	-12	6	-72		Rutland Water SSSI	76	-7	-20
Teesmouth and Cleveland Coast SPA	11	4	-7		Combe Pool SSSI	-8	-26	-18
Lower Derwent Valley SPA	11	-41	465		North Norfolk Coast SSSI	43	168	296
Humber Estuary SPA	40	79	60		Mersey Estuary SSSI	161	209	281
Northumbria Coast SPA	10	15	17		Lune Estuary SSSI	-14	-3	5
Hornsea Mere SPA	-61	-26	28		Staines Moor SSSI	63	-36	58
The Wash SPA	26	3	47		Morecambe Bay SSSI	4	28	0
Nene Washes SPA	46	93	178		Newton Marsh SSSI	-35	-55	186
Ouse Washes SPA	1	-35	-44		Abberton Reservoir SSSI	83	115	183
Rutland Water SPA	78	-7	-22		Chingford Reservoirs SSSI	28	-27	-46
North Norfolk Coast SPA	46	165	96		South Walney and Piel Channel Flats SSSI	2	39	73
Minsmere-Walberswick SPA	200	248	149		Exe Estuary SSSI	9	-20	-9
Alde-Ore Estuary SPA	91	329	692		Grafham Water SSSI	85	-6	-48
Stour and Orwell Estuaries SPA	268	360	96		Little Paxton Pits SSSI	30	14	-74
Hamford Water SPA	583	669	1018		Hornsea Mere SSSI	-61	-26	28

Abberton Reservoir SPA	83	115	183		Orwell Estuary SSSI	257	310	310
Breydon Water SPA	56	-56	-81		Halvergate Marshes SSSI	55	-56	-81
Dengie (Mid-Essex Coast Phase 1) SPA	146	86	-47		Chew Valley Lake SSSI	125	74	65
Colne Estuary (Mid-Essex Coast Phase 2) SPA	23	1	-17		The Wash SSSI	9	-29	7
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	7	92	188		Chesil and The Fleet SSSI	17	21	5
Foulness (Mid-Essex Coast Phase 5) SPA	-1	-17	-24		Deeping Gravel Pits SSSI	69		-10
Broadland SPA	68	169	42		Foulness SSSI	-1	-17	-24
Deben Estuary SPA	56	41	-8		Taw Torridge Estuary SSSI	48	32	75
Somerset Levels and Moors SPA	24	25	395		Alde-Ore Estuary SSSI	91	329	692
Chew Valley Lake SPA	125	74	65		Chichester Harbour SSSI	27	13	-1
Exe Estuary SPA	10	-19	-9		Hanningfield Reservoir SSSI	59	-8	70
Chesil Beach and The Fleet SPA	15	-9	25		Rostherne Mere SSSI	-65	-83	-76
Poole Harbour SPA	18	32	13		Attenborough Gravel Pits SSSI	-8	-13	-15
Tamar Estuaries Complex SPA	3	-8	-45		Pitsford Reservoir SSSI	61	0	1400
Chichester and Langstone Harbours SPA	12	-2	-33		Stodmarsh SSSI	560	1220	1550
Portsmouth Harbour SPA	34	6	26		North Wirral Foreshore SSSI	121	232	1360
Solent and Southampton Water SPA	13	-5	6		The Swale SSSI	127	159	25
Avon Valley SPA	-2	56	109		Aqualate Mere SSSI	42	-12	70
The Swale SPA	127	159	25		Blithfield Reservoir SSSI	85	97	13
Thames Estuary and Marshes SPA	-15	-5	-32		South Thames Estuary and Marshes SSSI	23	36	18
Medway Estuary and Marshes SPA	53	-25	-80		Fairburn and Newton Ings SSSI	-18	-37	342
Pagham Harbour SPA	-46	-57	-28		Wraysbury and Hythe End Gravel Pits SSSI	9	-54	-21
Thanet Coast and Sandwich Bay SPA	118	157	50		Stour Estuary SSSI	43	43	2
Dungeness, Romney Marsh and Rye Bay SPA	67	45	353		Higham Ferrers Gravel Pits SSSI	46	58	92
Lee Valley SPA	-41	-59	136		Ribble Estuary SSSI	-52	75	245
South West London Waterbodies SPA	15	-52	9		Walthamstow Reservoirs SSSI	-26	-60	58

The Dee Estuary SPA	2	34	388		Gibraltar Point SSSI	176	237	810
Mersey Narrows and North Wirral Foreshore SPA	32	-15	541		Blackwater Estuary SSSI	-9	49	126
Upper Nene Valley Gravel Pits SPA	21	20	145		Tamar-Tavy Estuary SSSI	15	-19	-58
Morecambe Bay and Duddon Estuary SPA	-3	38	9		Deben Estuary SSSI	56	41	-9
Duddon Estuary SSSI	-1	18	51		Avon Valley (Bickton to Christchurch) SSSI	-62	-31	-61
Poole Harbour SSSI	17	30	61		Turnford and Cheshunt Pits SSSI	44	89	107
Howick to Seaton Point SSSI	50	69	-20		Northumberland Shore SSSI	9	-3	-26
Lindisfarne SSSI	-12	6	-72		Wyre Estuary SSSI	-7	57	59
Seal Sands SSSI	-53	-93	-88		River Eden and Tributaries SSSI	78	59	63
Seaton Dunes and Common SSSI	-15	-2	-13		Brading Marshes to St Helen SSSI	4	-15	20
South Gare and Coatham Sands SSSI	-16	-3	-3		Trinity Broads SSSI	39	43	51
Eling and Bury Marshes SSSI	10	-20	-48		Wraysbury Reservoir SSSI	19	-64	-8
Radipole Lake SSSI	15	-11	8		Wraysbury No 1 Gravel Pit SSSI	-12	-49	-73
Medway Estuary and Marshes SSSI	53	-25	-80		Amwell Quarry SSSI	76	63	127
Durham Coast SSSI	162	-12	-40		Sefton Coast SSSI	-27	33	249
Breydon Water SSSI	56	-56	-81		Mersey Narrows SSSI	78		78
Ouse Washes SSSI	1	-35	-44		Humber Estuary SSSI	39	73	56
Medina Estuary SSSI	15	-12	-5		Upper Nene Valley Gravel Pits SSSI	21	20	145
Dee Estuary SSSI (England)	16	38	620		Dungeness, Romney Marsh and Rye Bay SSSI	86	95	321
Pagham Harbour SSSI	-46	-57	-28		Teesmouth and Cleveland Coast SSSI	1	4	-10
Colne Estuary SSSI	23	2	-17					

Further information

Natural England evidence can be downloaded from our **Access to Evidence Catalogue**. For more information about Natural England and our work see **Gov.UK**. For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk** .

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