

THE STATUS OF THE EUROPEAN SHAG *PHALACROCORAX ARISTOTELIS** POPULATION ON THE ATLANTIC COAST OF THE IBERIAN PENINSULA

KUIFAALSCHOLVERS AAN DE ATLANTISCHE KUST VAN HET IBERISCH SCHIEREILAND

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A regional analysis of the status of the European Shag Phalacrocorax [Stictocarbo] aristotelis population on the Atlantic coasts of the Iberian Peninsula is presented. This is the first census to be made of this population. The total population was estimated to be approximately 2239 pairs in 1990-94. The first counts from Euskadi and Cantabria are presented, indicating a population of 57-67 pairs in Euskadi in 1994 and 36-41 pairs in Cantabria in 1992. The first census in Asturias dates from 1986 with 98-124 pairs, and the population has increased at an annual rate of 6%, reaching 199-250 pairs in 1997. There are records of partial counts made in Galicia since 1976. The population appears to have stabilised on the Cies and Ons Islands (Rías Baixas, Pontevedra), where it was increasing at 8-9% annually. The total count of 1462 breeding pairs on Cies and Ons accounts for 66% of the Atlantic Iberian population. As far as is known, the population in Portugal has stabilised, but there has been no census of the southern colonies since 1983. On the island of Berlenga there were 60 pairs in 1990-94, the number of pairs having changed very little since the first count in 1939.

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INTRODUCTION

The European Shag *Phalacrocorax aristotelis* has a distribution that is limited to the western Palearctic, and it breeds from the North Cape to the coasts of Morocco (Cramp & Simmons 1977). There are three subspecies: the Atlantic subspecies, (*P.a. aristotelis*) is the most abundant and its southernmost limit is located on the Atlantic coasts of the Iberian Peninsula. The population of this subspecies has been well documented for the British Isles (Evans 1984; Lloyd *et al.* 1991; Andrews & Carter 1993; Thompson *et al.* 1998, 1999), Norway

Table 1. European Shag population in Euskadi, Spain, 1990-94. Site number (#) refers to number of breeding location in Fig. 1. Shown are number of colonies in each breeding location in 1994 and number of nests in 1990 and 1994.

Tabel 1. Populatie Kuifaalscholvers in Euskadi, Spanje, 1990-94. Kolonie nummers (#) zijn terug te vinden in Fig. 1. Weergegeven zijn het aantal kolonies in 1994 en de aantallen broedparen in 1990 en 1994.

#	location	colonies	1990	1994
1	Planxia	1	1-2	2-4
2	C. Ogoño	1	14-17	20
3	I. Akez	1	6-8	8-10
4	Bakio-Billano	3	18-25	21-27
5	Barrika	1	1-3	6
Total		7	40-55	57-67

Table 2. European Shag population in Cantabria, Spain, 1992. Site number (#) refers to number of breeding location in Fig. 1. Shown are number of colonies in each breeding location and number of nests in 1992.

Tabel 2. Populatie Kuifaalscholvers in Cantabria, Spanje, 1992. Kolonie nummers (#) zijn terug te vinden in Fig. 1. Weergegeven zijn het aantal kolonies en de aantallen broedparen.

#	location	colonies	nests
6	M. Candina	1	6-7
7	M. Buciero	1	5-6
8	C. Quintres	1	7-8
9	I. Mouro	1	1
10	I. Portio	1	5-7
11	I. Conejera	1	9
12	I. Samosa-Desesperada	2	3
Total		8	36-41

(Barrett & Schei 1977; Barrett & Vader 1984; Røv 1990) and France (Guermeur & Monnat 1980; Maout 1990; Cadiou 1996). On the Iberian Peninsula, however, there is an estimate of the overall population only for 1981 (Barcena *et al.* 1984) based on counts taken exclusively on the Galician and Portuguese coasts (Barcena *et al.* 1987; Teixeira 1984). This contrasts with the wealth of information on the Mediterranean subspecies (*P.a. desmarestii*) on the Iberian Peninsula (de Juana 1984; Ferrer *et al.* 1984; Capella *et al.* 1986; Guyot 1993). This paper describes the recent status and distribution of European Shag colonies on the Atlantic coast of the Iberian Peninsula by region.

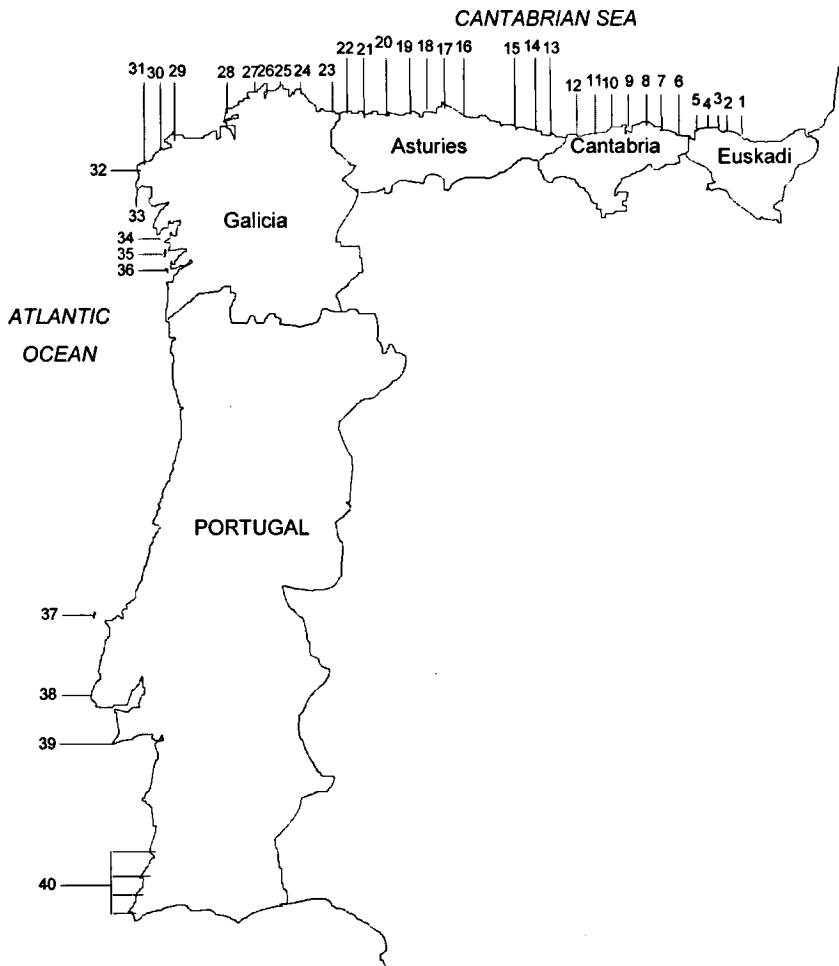


Figure 1. Positions of the main breeding locations of the European Shag in each region of the Atlantic coast of the Iberian Peninsula. Details of the number of colonies and pairs at each location are given in Tables 1-5.

Figuur 1. Ligging van de voornaamste broedkolonies van Kuifzwalvers langs de Atlantische kust van Spanje en Portugal. Zie verder tabel 1-5.

METHODS

From 1990 to 1997, breeding pairs were counted in all coastal colonies except those on the south-east coast of Portugal, which has not been censused since 1983. For each colony the number of well-built nests was scored as the number

of pairs. For each census we present the minimum number of pairs counted, and for some, an estimate of probable nests or nest sites that were not actually located but where adults were seen to enter. Nearby colonies were grouped into breeding locations for descriptive purposes. In breeding locations that were censused more than three times, the mean annual growth rate was estimated by $N_t = N_0 e^{rt}$, where N_0 is the population size at the outset, t is the time in years, N_t is the population size after time t , and r is the *per capita* growth rate of the population. Annual growth rate was expressed as $r \times 100$.

RESULTS

The location of the European shag colonies on the Atlantic Iberian Peninsula are shown in Fig. 1. A total of 87 colonies was identified at 40 breeding locations. The total population of the Iberian Peninsula was estimated to be 2320-2372 pairs (counts between 1992 and 1994). Details of censuses in each region are presented below.

Euskadi and Cantabria - Most of the recent data on Iberian Peninsula breeding colonies is from the Cantabrian coast. The first census undertaken in Euskadi dates from 1990 (40-55 pairs), and in 1994 between 57 and 67 pairs were recor-

Table 3. European Shag population in Asturias, Spain, 1976-94. Site number (#) refers to number of breeding location in Fig. 1. Shown are number of colonies in each breeding location in 1994; - = unoccupied colonies during the year census was made. Shown are number of colonies in each breeding location in 1994 (- = unoccupied colonies during the year census was made) and number of nests in 1986-97.

Tabel 3. Populatie Kuifaalscholvers in Asturias, Spanje, 1976-94. Kolonie nummers (#) zijn terug te vinden in Fig. 1. Weergegeven zijn het aantal kolonies in 1994 en de aantallen broedparen in 1986-97 (- = kolonie niet bezet).

#	location	colonies	1986	1989	1991	1992	1994	1997
13	Franca-S. Emeterio	2	3-6		2-5	3-5		1-2
14	Ribesella-Vidiagu	5	7-21	10-24	16-20	24-29		12-26
15	Tazonas-Rodiles	2	1-6	-				
16	Campa Torres	1	-	1-2				1
17	Cabu Peñes	1	1	1-2	1-2	2-4	4	10-13
18	La Deva	1	-	2-3	6	2	8	13
19	Porceberas-Gavieru	8	40-41	59-65	72-78	72-74	68-70	67-87
20	Raposeira-Osa	4	9	15-25	17	15-17	11-13	6-10
21	Gaivoteiro-Castelo	4	23	32-35	18-21	7-10	18-19	41-45
22	Pantorgas-Talaya	4	14	18	21-28	32		48-53
Total		32	98-124	138-174	153-177	157-173		199-250

Table 4. European Shag population in Galicia, Spain, 1976-94. Site number (#) refers to number of breeding location in Fig. 1. Shown are number of colonies in each breeding location in 1994 (- = unoccupied colonies during the year census was made) and number of nests in 1976-94.

Tabel 4. Populatie Kuifaaalsholwers in Galicia, Spanje, 1976-94. Kolonie nummers (#) zijn terug te vinden in Fig. 1. Weergegeven zijn het aantal kolonies in 1994 en de aantallen broedparen in 1976-94 (- = kolonie niet bezet).

#	location	colonies	1976	1981	1986	1994
23	Punta Niño do Corvo	1	-			1
24	Ansarón- San Ciprian	4	20-31			39
25	Coitelo-Tres Martas	2	-			16
26	C. Ortegal	3	6			38
27	P. Candiera	1	-			7
28	C. Prior- I. Gabeiras	4	11			49
29	I. Sisargas - Malpica	2	54	27		61
30	Corme-Laxe	2	-	29		8-15
31	C. Vilan	1	15	28		46
32	P. Buitra-Muxia	2	20-25	18		17
33	Finisterre	7	101	88		123
34	I. Sagres- I. Noro	2	-	-		12
35	I. Ons	1	122	193	305	557
36	I. Cíes	1	190	292	398	905
Total		33	539-555			1932

ded in seven colonies (Sociedad Ornitológica Lanius, Table 1). The difference between the first and second census estimates may be attributable to an improvement in the census methods applied. The most important colony in Euskadi is at Cabo Ogoño with 20 pairs in 1994. The only census in Cantabria (Table 2) was carried out in 1992, and indicated that 36-41 pairs were breeding in eight colonies (G. Orizaola, unpublished data).

Asturias - The first count in Asturias was made in 1986, and indicated a total of 98-124 pairs (Coordinadora Ornitológica d'Asturias). The population has been increasing and in 1997, 199-250 pairs were counted, representing an average annual rate of increase of 6% (Table 3). The population is distributed among small colonies each containing fewer than 25 pairs. The most important breeding area is located between the Porceberas Islands and the cliffs of Gaviero (no. 19, Fig. 1), where a total of 67 well-built nests was recorded in 1997. This locality hosts eight colonies, the largest of which (La Caladoria) holds eight pairs. Most colonies exhibited irregular growth; numbers of nests in the breeding areas of Gaivotero-Castelo (no. 21, Fig. 1) and Ribesella-Vidiagu (no. 14, Fig. 1) fluctuated over the years the censuses were carried out; the colonies

Table 5. European Shag population in Portugal, 1981-94. Site number (#) refers to number of breeding location in Fig. 1. Colonies = number of colonies in each breeding location in 1994; - = unoccupied colonies during the year census was made.

Tabel 5. Populatie Kuifaalscholvers in Portugal, 1981-94. Kolonie nummers (#) zijn terug te vinden in Fig. 1. Weergegeven zijn het aantal kolonies in 1994 en de aantallen broedparen in 1939, 1981-83 en 1990-94 (- = kolonie niet bezet).

#	location	colonies	1939	1981-83	1990-94
37	Berlengas	1	70	70	50-60
38	Cabo da Roca	1		5	5
39	Cabo Espichel	1		5	5
40	SW Coast	4		50	
Total		7		130	

of Pantorgas-Talaya (no. 22, Fig. 1) showed an annual increase of 11% between 1986 and 1997; and the colonies located in Porceberas-Gavieiru (no. 19, Fig. 1) increased by 12% annually between 1986 and 1991, stabilising at around 70 pairs between 1991 and 1997.

Galicia - Galicia is currently the most important region with 34 colonies and 86% of the total population of the Atlantic Iberian Peninsula. The first census made in this region was in 1976, when the population was estimated at 539-555 pairs (Rodríguez-Silvar & Bermejo 1977). A partial census taken on the west coast in 1981 did not indicate any major changes, except on the Cíes and Ons Islands. In 1994, our census recorded a total of 1932-1939 breeding pairs. The breeding distribution of the European Shag in Galicia is extensive, but is not uniformly distributed; 77% of the population here is located in only two colonies (the Cíes Islands and the island of Ons, Table 4). On the Galician coast there are a substantial number of average-sized colonies, such as on the Isle of Anserón (no. 24, Fig. 1) which has 30 pairs, Los Aguillons on Cabo Ortegal (no. 26, Fig. 1) with around 40 pairs, Gabeiras Islands (no. 28, Fig. 1) with 22 pairs, Sisargas Islands (no. 29, Fig. 1) with 60pairs, Cabo Vilán (no. 31, Fig. 1) with 50 pairs, and the colonies of Fisterra (no. 33 Fig. 1) holding approximately 100 pairs. The population on the Cíes Islands and the island of Ons (two colonies located less than 15 km apart) numbered 703 pairs in 1986 (Callejo *et al.* 1986), and has doubled during the last eight years to 1462 pairs. This indicates average annual rates of increase of 9% on the Cíes Islands and 8% on the island of Ons.

Portugal - There are around 130 breeding pairs distributed among scattered colonies in this region. The largest colony is on the Berlengas Islands with 50-60 pairs (Table 5, Teixeira & Granadeiro, unpublished data). This colony

Table 6. Growth of the European Shag population in the Atlantic Iberian Peninsula, 1981-1994. The 1981-83 data are from Barcena *et al.* (1984) and the 1990-1994 data from this study. Site numbers (#) refer to numbers of breeding locations in Fig. 1.

Tabel 6. Groei van de populatie Kuifaalscholvers langs de Atlantische kust van Spanje en Portugal. De gegevens over 1981-83 zijn ontleend aan Barcena *et al.* 1984, de recente gegevens komen uit de huidige studie. Kolonie nummers (#) zijn terug te vinden in Fig. 1.

#	breeding area	1981-83	1990-94
1-23	Cantabrian coast	90	251
24-28	Rias Altas	220	149
29-33	Costa da Morte	200	255
34-36	Rias Baixas	500	1474
37-40	Portugal	130	110 ¹
Total		1140	2239

¹the SW Portugal population was assumed not to have changed from 1983 (see Table 5).

appears to be well-established, with no major changes since 1939 when Lockley (1952) estimated the population to be approximately 70 pairs. The colonies on the south-west coast have not been counted since 1983.

DISCUSSION

We estimated that the population of European Shags on the Atlantic Coast of the Iberian Peninsula was 2239 pairs in 1990-94 (Table 6). This represents a 100% increase since the 1981-83 census (Bárcena *et al.* 1984), an increase that may be attributable to several different causes. Firstly, it must be noted that the 1981-83 data from the entire Cantabrian coast and the Rías Altas are not exact counts but are estimates. The increase in the number of pairs in this census could reflect the more accurate information now available from breeding localities, especially if account is taken of the fact that the first census made in Asturias in 1986 already revealed more pairs than those estimated in 1983 for the entire Cantabrian coast. It also reflects a real increase in some of the breeding colonies as was found to occur in several colonies in Asturias and Galicia. Thus, the Galician and Portuguese populations appear to have stabilised since the counts of 1981-83 (Teixeira 1984; Bárcena *et al.* 1987), exceptions being the population of the Cíes and Ons Islands. Here, there has been large population growth and the islands presently account for 66% of the Atlantic subspecies in the Iberian Peninsula, rendering them the most important breeding grounds of the European Shag at its southernmost limit.

The Cíes and Ons Islands populations exhibited a yearly growth rate of between 8 and 9%, with a maximum on the Cíes Islands of 15% annually between 1986 and 1992 (Velando 1997). This is similar to the population increase reported elsewhere. On the island of Canna, west Scotland, there was an annual increase of 9% between 1974 and 1984, the nest count increasing from 856 to 1753 (Swann *et al.* 1994); on the Farne Islands, north-east England, an 11% annual increase has been recorded, the original 1890 count of 10 pairs rising to 1900 pairs in 1969 (Potts 1969); and on the Isle of May, east Scotland, the population increased from 1 pair in 1918 to 1916 pairs in 1987, representing an average annual rate of increase of 11% and a maximum growth rate of 15% until 1973 (Aebischer & Wanless 1992). The increase in the number of nest sites on the Cíes Islands between 1986 and 1992 may be related to the fact that these islands were declared a Natural Park in 1980, and since the establishment of the Wildlife Service in 1984 have been managed by the Autonomous Government (Xunta de Galicia). Seabird colonies on the island of Ons also receive special protection. The establishment of protected areas has had a notable effect. Traditional practices, such as the taking of eggs and chicks for human consumption have ceased, and there has been a reduction in human disturbance. A ban on hunting from boats and the enforcement of this ban in the 1980s has helped greatly in the conservation of this species. The cessation of these practices may also have contributed to the increase in the population on the Asturian coast. On the Farne Islands between 1890 and 1965, population growth was also related to habitat protection, the reduction of disturbance in the breeding colonies, and the cessation of human exploitation (Potts 1969).

The distribution of the European Shag on the Atlantic coast of the Iberian Peninsula is quite dispersed (Fig. 1), with 87 colonies scattered all along the coast. Of these, 87% have fewer than 20 pairs, 11% have between 20 and 60 pairs, and only two colonies contain more than 500 pairs, namely the island of Ons with 557 pairs and the Cíes Islands with 905 pairs. These islands, which are less than 15 km apart, hold approximately 2% of the world population of the European Shag. Along with the island of Foula, Shetland Islands (2400 pairs), the Shiant Islands, west Scotland (1776 pairs), Lambay Island, Ireland (1597 pairs), the Isle of May (1524 pairs), the Farne Islands (1248 pairs), Runde, Norway (2100 pairs), and Lille Kamøy, Norway (2400 pairs), they are among the largest colonies of this species (Røv 1990; Lloyd *et al.* 1991). Applying Lloyd's (1984) criteria, they must be accorded international importance, this having resulted in the designation of this area as an Important Bird Area by the Spanish and European authorities.

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SAMENVATTING

In dit artikel wordt een overzicht gegeven van alle kolonies Kuifaalscholvers Stictocorax [Phalacrocorax] aristotelis langs de Atlantische kust van Spanje en Portugal. In totaal werden bij tellingen tussen 1990 en 1994 2239 broedparen aangetroffen, waarvan 66% op de Cies en Ons Eilanden voor de kust van Galicia (## 35 en 36, Fig. 1). Niet alle kolonies werden recentelijk onderzocht, maar over het algemeen lijkt de periode van groei (vooral op genoemde eilanden) tot staan gekomen te zijn. In Euskadia nam het bestand op vijf kolonies toe van 40-55 paren in 1990 tot 57-67 paren in 1994. Zeven kolonies in Cantabria werden alleen in 1992 onderzocht (36-41 paren). In Asturias werden in 1997 op tien kolonies 199-250 broedparen geteld (vgl. 98-124 paren in 1986). In Galicia werden 14 kolonies bekeken, sommige belangrijke om de vijf jaar (1976-94). Op de Cies en Ons Eilanden nam het bestand toe van 312 paren in 1976 via 485 in 1981, 703 in 1986 tot 1461 paren in 1994. De Portugese zuidwest kust werd sinds 1983 niet meer onderzocht, maar in Portugal lijkt de populatie gestabiliseerd te zijn op een niveau van ongeveer 130-150 paren.

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