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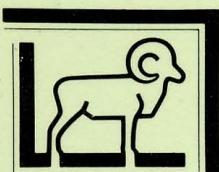
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The Italian breeding population of Cormorant (*Phalacrocorax carbo*)

INTRODUCTION

In past centuries, the Cormorant in Italy was known to breed both in wetlands, usually alongside herons, and on sea-cliffs (Salvadori, 1872). Breeding colonies on the mainland progressively disappeared during the last century, but in Sardinia four colonies were still present between 1965 and 1975 (Baccetti & Brichetti, 1992; Schenk, 1976). Beginning in 1981, a few nesting attempts have been recorded in north-eastern Italy, but the first mainland colony was re-established in 1986 (Spina *et al.*, 1986). At present, the breeding range of the Cormorant in Italy comprises Sardinia, the Po delta (NE Italy), and the Piedmont region (NW Italy) (Fig. 1). Occasional breeding occurred in 1990 and 1993 in Lombardy (along the Po river, Mantova province, and in fish ponds near the Adda river, Cremona province), in 1992 in Sicily (Catania province) and in 1994 on the plain near Bologna (Baccetti & Brichetti, 1992; Ciaccio, 1993; Tinarelli, 1995).

RESULTS AND DISCUSSION

The Italian breeding population has been increasing since 1986 at a mean annual rate of 15,2% (from 1989 to 1995, 7 colonies). The Piedmont population has increased most rapidly (33,2%, 6 years, 1 colony), followed



Fig. 1 - Location of the Italian colonies: squares= regular colonies; triangles= occasional colonies; ?= breeding attempts.

by the Po Delta population (22,8%, 9 years, 5 colonies). In contrast, the Sardinian population at S. Caterina di Pittinuri is declining, probably because of persecution in wetlands in the northern Oristano Gulf, the usual feeding ground of these birds (Tab. 1).

Colonies are mainly located in natural freshwater habitats (rivers and estuaries) or artificial ones (fishing ponds), while only the Sardinian population nests on cliffs (Tab. 2). The latter situation is very interesting, as birds have been considered as belonging to the *sinensis* subspecies which usually breeds in inland habitats. On the mainland, either dead or living trees are

TAB. 1 - Number of pairs Cormorant in Italian colonies.

Colony	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Santa Caterina (OR)	?	33-36	?	62-65	74	75	75	70-75	70-72	60	45
Val Campotto (FE)	1	12	61	90	144	180	216	249	270	280	252
Oldenico (VC)					5	9	21	32	52	56	63
Valle Bertuzzi (FE)									12	86	98
Valle Mandriole (RA)										3	26
Punte Alberete (RA)											1
Cornale (AL)										?	2
Po river (MN)							1				
Lake of Lentini (CT)									6-8		
Adda river, Zerbaglia (CR)										5	
Malalbergo (BO)											2
Total		1	45-48	61	153	223	264	312	364	411	487
											487

TAB. 2 - Habitat and nest site characteristics of Italian Cormorant colonies, 1995.

	Santa Caterina	Val Campotto	Oldenico	Valle Bertuzzi	Valle Mandriole	Punte Alberete	Cornale
Habitat	sea-cliff	fish-ponds	river islet wood	brackish lagoon	ponds, wet woods	ponds, wet woods	river shore
Altitude a.s.l.	40	10	140	1	1	1	120
Substrate	rocks	dead trees	living trees	dead/living trees	reeds dead/living trees	living trees	living trees
Height	0-1	0.5-15	10-30	6-12	0-2	12	15-20

used as nest sites. In the colony of Val Campotto, availability of nest sites has been strongly decreasing due to the collapse of flooded dead trees. Here, some Cormorant pairs now nest in living trees on the banks of the pond, and a few pairs have successfully attempted to breed in reed stands during the last seasons. Nests are usually located within heronries, with associated species shown in table 3. Only at the Valle Mandriole colony do Cormorants breed especially close to other species. The height of nests above ground or water ranges from 0 to 30 m. In older colonies, nest sites are occupied beginning from mid-January, earlier than in the very recent colonies (Tab. 4). Colony size is indicated in table 1 by the maximum number of occupied nests recorded in each season. As a consequence of the long breeding season, at least in the colonies of northern Italy, some nest sites are occupied more

TAB. 3 - Other colonial species observed breeding close to Cormorants: I= irregularly or occasionally; R= regularly.

	Santa Caterina	Val Campotto	Oldenico	Valle Bertuzzi	Valle Mandriole	Punte Alberete	Cornale
<i>Phalacrocorax aristotelis</i>	R						
<i>Phalacrocorax pygmeus</i>						I	
<i>Nycticorax nycticorax</i>			R			R	
<i>Ardeola ralloides</i>			R			R	
<i>Bulbucus ibis</i>			R			R	
<i>Egretta garzetta</i>			R	R		R	
<i>Egretta alba</i>			R		R	R	
<i>Ardea cinerea</i>		R	R		R	R	R
<i>Ardea purpurea</i>					R		
<i>Plegadis falcinellus</i>						I	
<i>Platalea leucorodia</i>			I				
<i>Threskiornis aethiopicus</i>			I				
<i>Larus cachinnans</i>	R						

than once per season; therefore, the total number of nesting attempts is actually higher than the maximum number of nests recorded (Grieco *et al.*, 1995).

The breeding success (Tab. 4), in terms of number of fledglings per pair, appears similar to other European populations. In two colonies, breeding of immature-plumaged birds has recently taken place, including immatures breeding successfully together. In the north Italian colonies, regular breeding by immature birds may suggest a mechanism for population regulation in which more birds can breed in years and/or areas with high food and nest availability. Occurrence of breeding by immature birds is well known in

TAB. 4 - Phenology and breeding success at Italian colonies, 1995. * Data from 1994.

	Santa Caterina	Val Campotto	Oldenico (*)	Valle Bertuzzi	Valle Mandriole	Punte Alberete	Cornale
Early nests	mid Jan	mid Jan	late Jan	mid Mar	mid Mar	mid Jun	May
Max n. nests	late May	early May	Mar	mid May mid-Jun	late Apr mid May	mid Jun	-
Last fledging	late Jul	mid Sep	mid Sep	late Sep	early Jul	-	-
Second brood behaviour	no	yes	yes	no	no	-	-
Imm. breeding	no	yes	yes	-	-	no	no
Breeding success	2,4	2,8	2,7	2,6	2,3	-	2,0

Europe, but not at many colonies, and immature breeders are known to have a low breeding success (Kortlandt, 1942). Immatures are also known to breed in large colonies which have reached the stabilization phase (T. Bregnballe, pers. comm.). We do not have any data about recent changes in food availability in the habitats surrounding colonies, but in the Oldenico and Val Campotto colonies fledgling production has not changed over the last four years. However, the number of nesting attempts of immature birds is negatively correlated with the availability of nest sites, and the decline of the breeding population at Val Campotto therefore may be due more to availability of nest sites than food supply.

In two colonies, the behaviour of some pairs late in the season suggests that second broods could have occurred at least during years of strong population growth as incubating birds were observed alongside nests with chicks at the fledging stage (Grieco, 1994). Although birds were not individually marked, a lack of aggressiveness towards juveniles suggests that some pairs renested later in the season after a successful attempt. The same behaviour was observed in a newly-established colony in France (Demongin, 1993). The occurrence of second broods in natural condition has been recorded very rarely in Europe (Cramp and Simmons, 1977) and usually in association with very high food levels. Recent records of second broods have been recorded from marked birds in large Danish colonies (T. Bregnballe, pers. comm.). As with age at first breeding, rearing second broods seems to be commoner during the growth phase of the population. Further colour ringing is required to determine the frequency of occurrence of double brooding in relation to the stage of colony establishment.

Recent changes in the availability of nest sites in tree colonies cause birds to respond in different ways: (a) shifting to sites of different structure and quality within the colony area, such as reeds or broken trees; (b) forming new subcolonies outside the original colony, *i.e.* in living trees on the pond shore; (c) delaying breeding until nest sites are available; or (d) migrating to breed in nearby colonies, which may have occurred in some birds from Val Campotto.

Counts of nesting pairs should be conducted carefully especially when breeding phenology is protracted and re-nesting attempts occur. At least one count of occupied nests in early May and one in summer can estimate the number of nesting attempts to give a reliable index of population growth.

Disturbance in most breeding colonies seems to be low or absent as most colonies are within nature reserves. Direct persecution was recorded only at Valle Bertuzzi, one of only two unprotected colonies (with Santa Caterina).

According to the Habitat Evaluation Procedure (Brichetti and Gariboldi, 1992 & 1994), Cormorant scores a Total Standardized Value of 61.8, placing it 52nd on the Italian list.

As stated by other authors, due to isolation, habitat characteristics and conservation of biological diversity, the Sardinian colony of Santa Caterina di Pittinuri urgently requires protection as a nature reserve.

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SUMMARY

An overview of the Cormorant breeding colonies in Italy is presented. Numbers of pairs from 1985-1995 are reported for each breeding site, while details on habitat, breeding behaviours and breeding success are also presented. The current population size is nearly 500 pairs, and the average increase over the last 6 years 15,2%.

RIASSUNTO

La popolazione nidificante italiana di Cormorano (*Phalacrocorax carbo*)

Si presenta una visione complessiva della presenza riproduttiva del Cormorano in Italia, completa di numeri di coppie per sito (1985-1995) e dettagli su habitat, comportamento riproduttivo e successo riproduttivo (dati riferiti soprattutto al 1995). La popolazione conta quasi 500 coppie, ed è stata caratterizzata da un incremento medio del 15,2% negli ultimi 6 anni.

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