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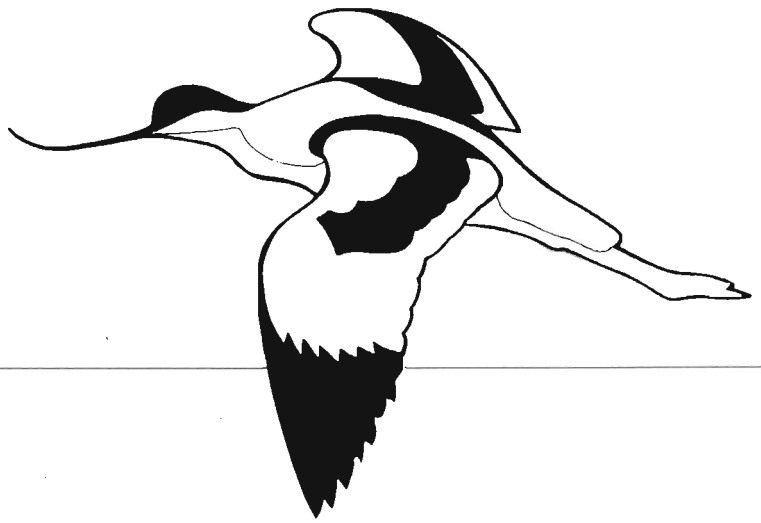

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Volume 16 Dicembre 1992 N. 2

Avocetta N° 16: 61 (1992)

Introductory Remarks

This special issue of *Avocetta* contains the ornithological papers presented at the Symposium "Management of island and coastal ecosystems in the Mediterranean". The Symposium, which was held in Chios in 1992, continued the successful series of meetings (the first in Alghero, 1986, and the second in Calvia, 1989) organized by *Medmaravis* on the special topic of Mediterranean fauna. The other contributions to this Symposium, focusing on coastal parks, marine wildlife and conservation projects, will be published in *Bios*, a journal produced by the University of Thessaloniki.

The ornithological papers describe various aspects of seabird life about which little is still known in the Mediterranean, even with regard to the basic aspects of general biology and population data. Interesting and new information is reported on some populations in the neighbouring Black Sea. Many papers deal with seabird protection, in line with the conservationist focus of the Symposium. Species of particular concern, such as the scarce Audouin's and Slender-billed gulls, are the subject of several papers. In order to comply with *Avocetta's* editorial policy each paper was reviewed by a referee and underwent appropriate revision before being accepted for publication.

Mauro FASOLA
Dipartimento di Biologia Animale, P.za Botta 9, 27100 Pavia, Italy

Avocetta N° 16: 61 (1992)

Ornithological papers from the Symposium

Management of island and coastal ecosystem in the Mediterranean

organized by MEDMARAVIS
Chios, Greece, 15-20 September 1992

edited by Mauro Fasola

Avocetta N° 16: 63-66 (1992)

Conservation programme for Audouin's Gull in the Chafarinas Islands

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Abstract — I review population changes from 1976 to 1992 in the Audouin's Gull colonies of Chafarinas Islands National Game Sanctuary. Earlier studies showed that after increasing rapidly between 1976 and 1983, the Audouin's Gull population stabilized, and breeding success decreased until 1985. This decrease was linked to a rapid increase in Yellow-legged Gulls over the same period, and was attributed to predation and to limited nesting sites. Yellow-legged Gulls have been controlled since 1987 by narcotizing adults and sterilizing eggs. After 6 years culling, the Yellow-legged Gull population and the breeding success of Audouin's Gulls were similar to those of 1983, but the breeding Audouin's Gull pairs had doubled during the same period. It is suggested that immigration of Yellow-legged Gulls reduces the effectiveness of culling. The rat population may also limit the breeding success of the Audouin's Gull.

Introduction

The Chafarinas Islands host a very important part of the world breeding population of the Audouin's Gull *Larus audouinii*. In 1966 Brosset and Olier estimated it at 500 pairs (1966). Since 1976 close monitoring has been carried out (Varela and De Juana 1986, Bradley 1988). In 1982 the Chafarinas Islands were declared a National Game Sanctuary and the monitoring has been conducted by the National Institute for Nature Conservation (ICONA, Spain).

The colony doubled in size between 1976 and 1983 (from 1000 to 2000 breeding pairs). Over the following three years the population stabilized and breeding success decreased. This decrease was linked to a rapid increase in the Yellow-legged Gull *Larus cachinnans michahellis* over the same period (from 850 in 1976 to 4000 in 1983), similar to that found in other Mediterranean colonies (Mayol and Muntaner 1985). The decrease was attributed to predation and competition for nesting space between the two species (De Juana *et al.* 1984, Varela and De Juana 1986, Bradley 1986).

Since 1987 a programme has been underway to limit Yellow-legged Gulls, involving the culling of the breeding population (Thomas 1972, Troya *et al.* in press).

I summarize six year's monitoring and management of Audouin's and Yellow-legged Gull colonies in the Chafarinas Islands National Game Sanctuary. Population censuses have been carried out and the breeding success of Audouin's Gulls evaluated.

Study area

The Chafarinas Islands are located south of the Alboran Sea, in the Western Mediterranean (35° 11'N, 2° 26'W), and lie 3.5 km off Ras-Quebdana on the north-east coast of Morocco (Figure 1). The archipelago is formed by three volcanic islands covered by a xerophytic scrub *(Lycium intricatum, Suaeda vera, Atriplex halimus, Salsola oppositifolia, Mesembrianthemun* spp., etc). Mean annual temperature is near 18° C and mean annual rainfall is 360 mm.

The main Yellow-legged Gull colony occupies all the biggest and most westerly island, Congreso (24 ha, reaching 137 m a.s.l.). The central island (Isabel II, 17 ha, 35 m), occupied by the army and the ICONA biological station, is 1 km away; no breeding colonies have settled there. Rey Island (13 ha, 31 m) is 175 m east. Here Yellow-legged and Audouin's Gulls share the available breeding range in separate colonies. The main Audouin's Gull colony is on Rey Island, although this species frequently breeds in the lower xerophytic scrub of Congreso Island, in a habitat similar to that occupied on Rey Island.

Methods

Two techniques were used to control the Yellow-legged Gull population: narcotizing birds and sterilization of eggs. One narcotic bait was laid on every nest found during an comprehensive search of the accessible sites on Congreso and Rey Islands. The sampling effort was similar over years of

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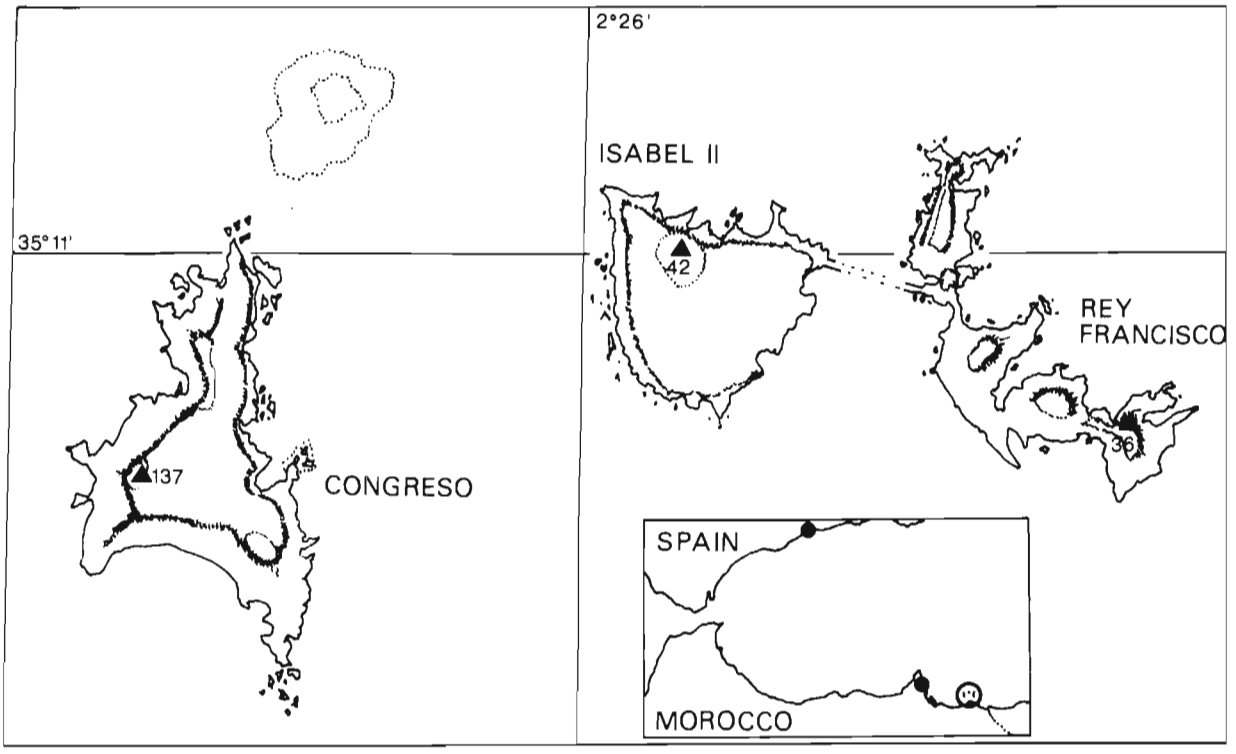

Figure 1. Study area, Islas Chafarinas.

monitoring (1st - 15th April 1987-1992). The baits contained a dose of nearly 200 mg of alpha chloralose and 50 mg of secobarbital sodium mixed with 1g of margarine. Simultaneously, all eggs except 1 at each nest were pricked by striking a spike into the egg. Care was taken not to smash the eggs to avoid their replacement by parent gulls (Thomas 1972).

Censuses of adults up to 1986 and of nests during the control years have been used to evaluate the year-to-year changes in the Yellow-legged Gull population on Rey and Congreso Islands. Similarly Audouin's Gull numbers were estimated annually by counting adults and nests around 15 May. Furthermore, in 1991 and 1992 censuses of adults of both species were carried out on the cliffs of Congreso and Rey. Numbers of breeding pairs in cliff habitats were calculated by dividing the number of individuals by a coefficient (0.6), obtained by comparing the number of breeding pairs and the number of individuals counted in baited areas on Rey Island. The interval obtained by dividing by the 0.6 value and by a hypothetic value of 1 (1 individual = 1 nest) was considered as a conservative estimate. Audouin's Gull fledglings have been marked since 1987 at the beginning of July with numbered plastic rings, which has allowed evaluation of chick survival (Chapman method; see Telleria 1986) and, thus, of breeding success. Breeding success values are shown as number of fledglings/eggs (Bradley 1986).

Results and discussion

The overall decrease of Yellow-legged Gull breeding pairs in the baited areas (accessible sites) since 1987 has been calculated at 30 per cent. The average annual rate experienced large fluctuations. Thus, during the 1988 control a high increase in pairs was found, and a slight increase was also reported during 1991. A mean of 59 % of one of two parent gulls were found dead after every annual control, but first breeder recruitment continued until 1990 (Yellow-legged Gulls reproduce for the first time at age 4). The 1991 Yellow-legged Gull population should therefore have dropped suddenly, as there was no incorporation of new breeders hatched in 1987, but it did not do so. After 6 years narcotizing, the total breeding population estimated in 1992 (3600-4600 pairs, including birds on cliffs) is similar to that estimated in 1983 (4000 pairs, Bradley 1986).

However, Audouin's Gulls doubled in numbers between 1983 and 1992, establishing a sizeable colony on Congreso Island over the last two years, where there had been no breeding records since 1982

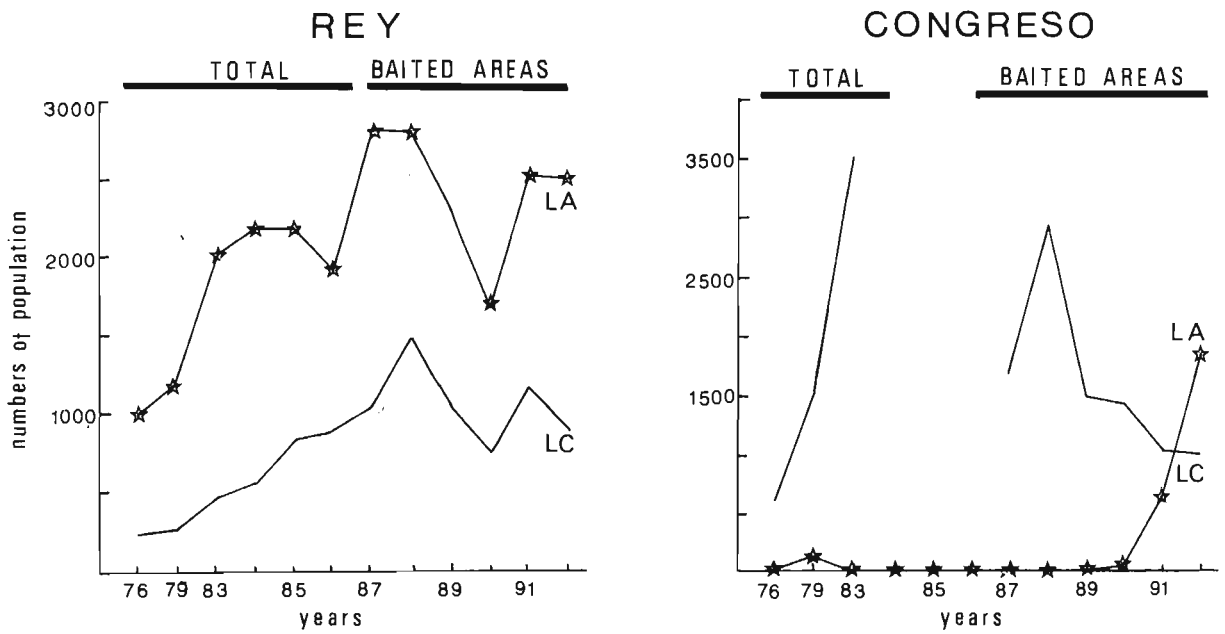

Figure 2. Year-to-year changes of the Audouin's (LA) and Yellow-legged (LC) Gull population on Rey and Congreso Islands. Total numbers were reported by Varela and De Juana 1986, and Bradley 1988. Since 1987, data are counts of nests on baited areas (accessible sites) obtained by this study.

(Figure 2). The breeding success of the Audouin's Gull dropped from 0.4 to 0.2 between 1983 and 1985 (Bradley 1986) remained around 0.2 between 1987 and 1991, and rose to 0.4 in 1992 (1 chick per pair, Figure 3).

Counts of Yellow-legged and Audouin's Gull individuals in cliff habitats showed contrasting shifts by the species between baited areas and cliffs from 1991 to 1992. In 1992 the number of Audouin's Gulls in baited areas increased by around 900 pairs, but on the cliffs a decrease of nearly 600 individuals was reported. The same year on the other hand, Yellow-legged Gull numbers decreased by around 400 pairs in baited areas, but increased by over 1000 birds on the cliffs. The estimated total number of Audouin's Gull breeding pairs thus increased by 7

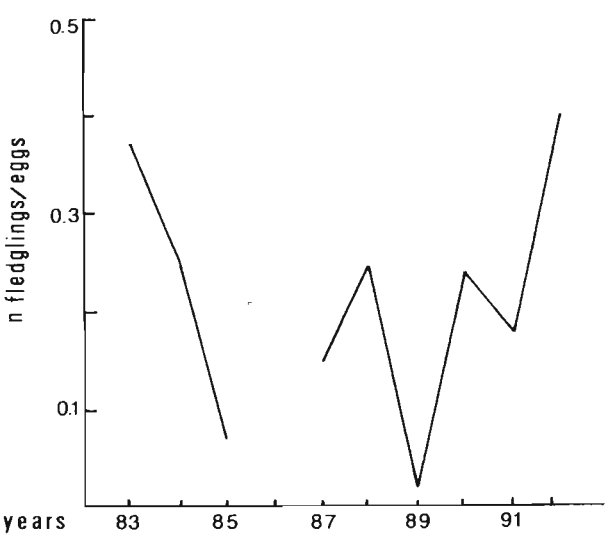

Figure 3. Changes in Audouin's Gull breeding success on Rey Island.

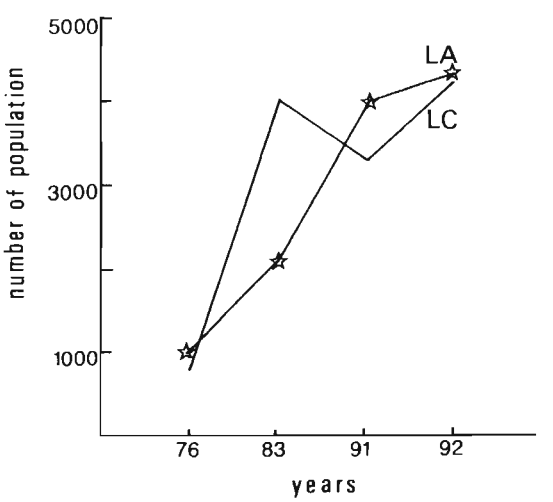

Figure 4. Changes in the total Audouin's (LA) and Yellow-legged (LC) Gull populations on Rey and Congreso Islands (accessible sites and cliffs).

per cent in 1992, and that of the Yellow-legged Gull increased by at least 24 per cent (Figure 4), in spite of the control programme, possibly due to immigration from other nearby colonies.

This increase has not had a negative effect on the later-breeding Audouin's Gull as might be expected according to the competition for nesting space hypothesis (Bradley 1986), but the extra Yellow-legged individuals have colonized the cliffs, a marginal habitat for Audouin's Gulls and, indeed, the dominant Yellow-legged Gulls. The population control programme could be having a deterrent effect on the permanent population. This would mean a reduction in predation by Yellow-legged Gulls upon Audouin's Gull in adjacent groups as well as an increase in the availability of suitable nesting habitat for the latter. In addition, new individuals would be prevented from breeding by the territorial behaviour of established birds (Birkhead and Furness 1985). Nevertheless, the gradual decrease in numbers of Yellow-legged Gulls in the baited areas has apparently not had an effect on the breeding success of Audouin's Gulls. The large increase in breeding success recorded in 1992 could be due to other factors. One known factor has changed noticeably between 1991 and 1992: the population of rats *Rattus rattus*, subject to a control programme prior to the 1992 Audouin's Gull breeding season.

The ICONA is going to support a three-year comparative study programme (1993-1995) of the Audouin's and Yellow-legged Gull populations of the Chafarinas Islands, Ebro Delta and Cabrera Archipelago (Spain). The aims are to determine the effects on Audouin's Gulls of weather conditions, the rat population, food availability and also interactions with Yellow-legged Gulls.

Acknowledgements — This research is part of the Chafarinas Islands management programme conducted by Natural Spaces Department of ICONA in accordance with the directives laid down in the Joint National Action Plan for the Conservation of the Audouin's Gull, which came into effect in 1987. Most of the technical and forestry staff at the Natural Spaces Department have taken part in this programme. Special thanks are also due to P. Bradley, E. de Juana, and J. Varela for providing data and assessment of the management design. I am grateful to L. Aschroft for the translation to English.

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Avocetta N° 16: 67-70 (1992)

Protection of Cory's Shearwater *Calonectris diomedea* by limitation of a population of Feral Rabbits *Oryctolagus* on the Frioul Archipelago (Marseilles, France)

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Introduction

Human introduction of domestic and anthropophilic mammals has caused considerable damage to island ecosystems throughout the world (Merton 1978, Croxall *et al.* 1984, Chapuis *et al.* 1991). Birds, especially seabirds, have suffered the impact of these introductions mainly because of predation: numerous examples of population declines, local extinctions and some total extinctions of species are documented (Dilks 1979, Moors and Atkinson 1984).

In the Mediterranean a decline in Procellariiform colonies has been noted on some islands: this is usually imputed to feral cats *Felis catus* or Black Rats *Rattus rattus* (Cheylan 1985, Fernandez 1988, Daycard and Thibault 1990).

However the action of some species of mammals on sea bird colonies can be indirect: Fernandez (1989 and 1991) has shown that the illicit introduction of rabbits *Oryctolagus* in 1984 on to the Frioul Archipelago off Marseilles (Figure 1) was immediately followed in 1985 by a reduction of Cory's Shearwater *Calonectrics diomedea* chick production (Figure 2b) and in 1986 by a decrease in the number of breeding pairs (Figure 2a). The Frioul Archipelago rabbits are hybrids between wild *Oryctolagus cuniculus* and domestic rabbits *Oryctolagus cuniculus* var. *domesticus*. Both species compete for the same breeding sites: rabbits either usurped or destroyed 18% of shearwater nesting cavities and were responsible for the destruction of *c.* 1% of eggs and the death of 1-2% of chicks. They also disturb the adult birds at the beginning of the breeding period which may presumably inhibit the nesting of a certain number of pairs.

To try to lower the pressure that the rabbit population exerts on the shearwater colony, reduction of the number of rabbits has been carried out every year since 1987. The aim of this paper is to give the results of this, both in the rabbit and the shearwater.

Study area

The Frioul Archipelago is situated in the Mediterranean, in the bay of Marseilles, its northerly point being only 1.8 km from the continental coastline (Figure 1). It consists of two islands, Ratonneau to the North and Pomègues to the South, and of an islet, Tiboulen de Ratonneau, to the West. The two islands were linked by a dyke during the 19th Century and cover a total surface area of 145 ha. Protected by this dam a marina and a tourist housing estate, named "Port-Frioul", were developed during the 1970s. With the exception of a few naval enclosures the Frioul Archipelago belongs to the City of Marseilles. The urbanized zone covers 12 ha, the rest is in "natural" state, characterized by outcrops of limestone, very little soil and a sparse and deteriorated vegetation, remnent of the typical plant community of the rocky coast of the Marseilles area.

Cory's Shearwater on Frioul Archipelago has been monitored by one of us (O.F.) since 1972, and all nests have been found since 1979. The birds were ringed as part of a personal programme with the *Centre de Recherches sur la Biologie des Population d'Oiseaux*. Maximum figures since 1979 were 73 pairs on Pomègues, 7 on Ratonneau and 5 on Tiboulen de Ratonneau (Figure 1).

Rabbits are only found on Pomègues Island. The rabbit population is hard to estimate because it is very unsteady, its size depending on different external parameters (rainfall and plant growth;

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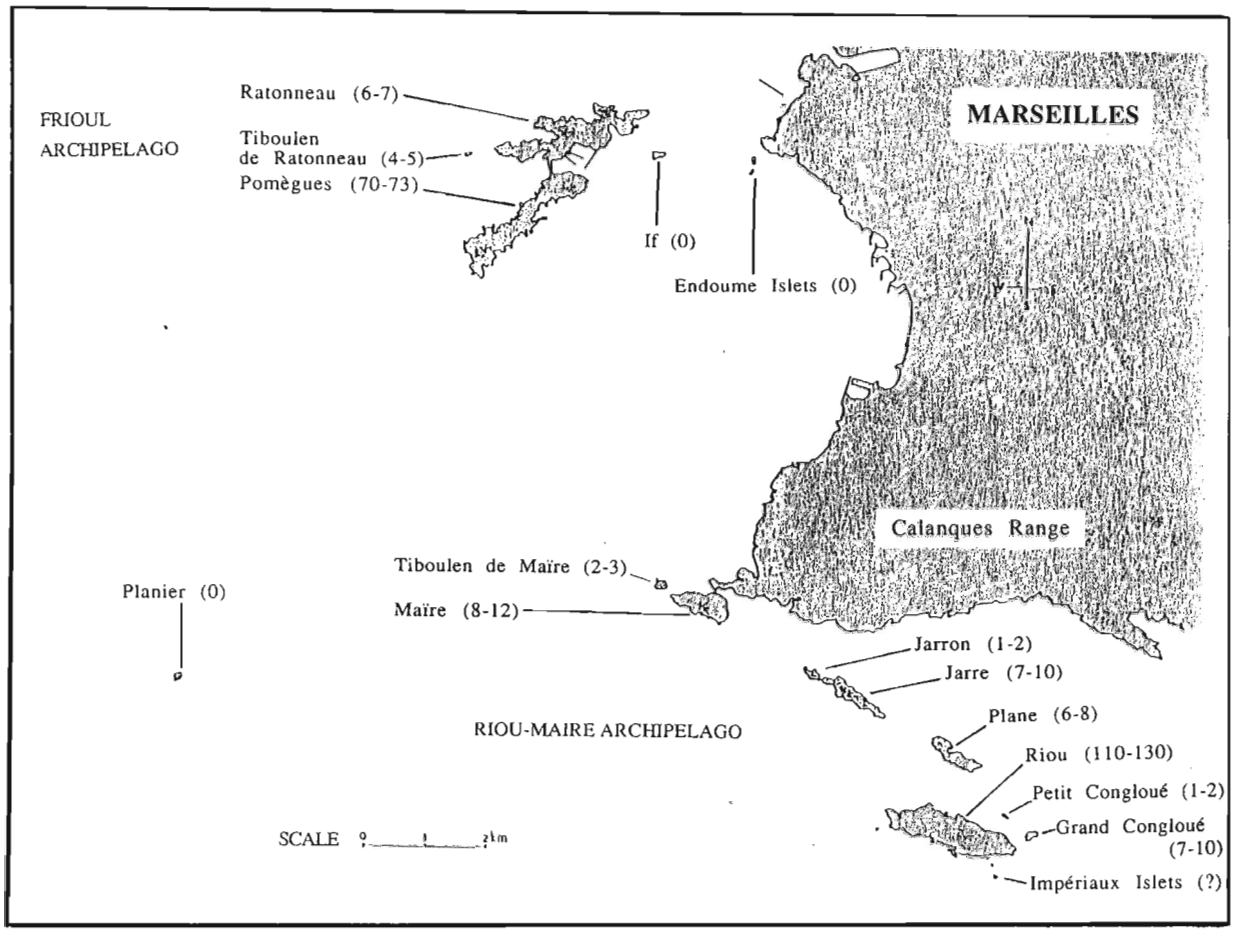

Figure 1. Distribution of Cory's Shearwater on the islands off Marseilles (France) before 1984 (after Fernandez 1991).

myxomatosis). A reasonable estimation is *c.* 150-200 individuals in November.

Methods

As owner of Frioul the City of Marseilles was called on in 1986 by the *Association Régionale pour la Protection des Oiseaux et de la Nature* to find a solution for the ecological imbalance caused by the presence of rabbits.

Different methods were experimented with to withdraw a maximum number of rabbits: with nets and hunting dogs *Canis familiaris* (1987-88), with Ferrets *Mustela putorius* var. *furo* (1989) and shooting after ferreting (since 1990). These operations took place while the shearwaters were absent, *i.e.* between November and March. Depending on weather conditions they lasted between 3 and 11 days and required the contribution of a daily average of 5-6 volunteer hunters.

Results

424 feral rabbits were withdrawn from Pomègues Island in 6 campaigns (from winter 1986-87 to 1991-92) (Figure 2c): 160 were captured alive and 264 killed. This represents an average of 70.7 rabbits/year and 1.8 rabbits/day/hunter. Important variations in the success of the operations were noted from year to year but these are not related to the effective size of the population. The landscape features (steep slopes, cracked limestone) are an explanation for the impossibility of reducing the number of rabbits in a substantial and long-lasting way by traditional huntig methods.

273 Cory's Shearwater chicks were fledged out of 321 monitored nests between 1979 and 1984 on Frioul: a yearly average of 45.5 chicks for 53.5 breeding pairs. All nests were monitored every year between 1985 and 1992 (*i.e.* after the introduction of rabbits on Pomègues Island): 246 chicks were fledged out of 406 nests (yearly average of 30.7 chicks for 50.7 pairs) (Figure 2b).

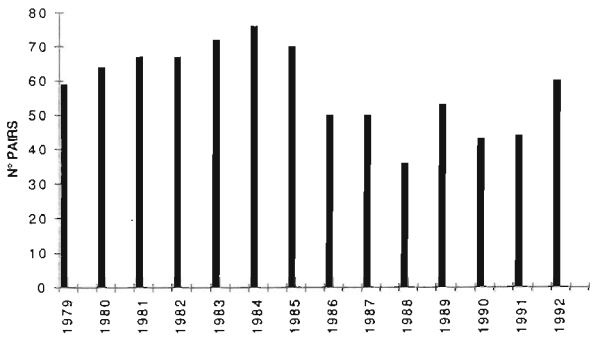

Figure 2a.

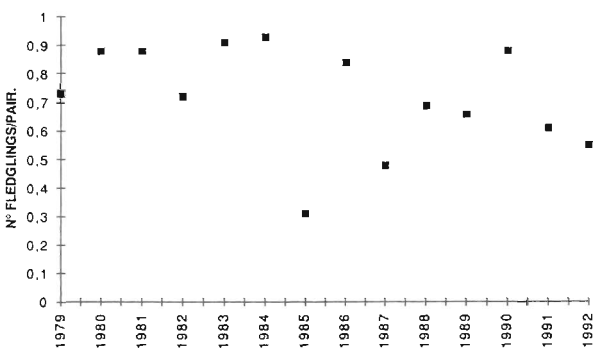

Figure 2b.

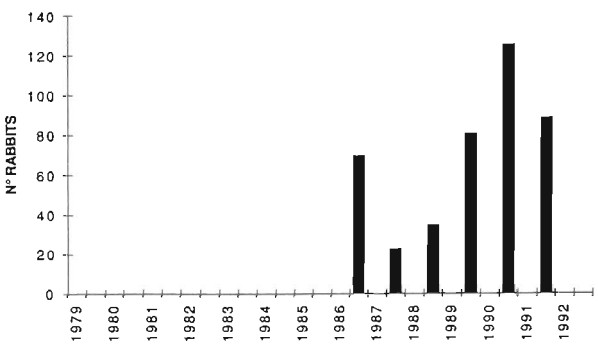

Figure 2c.

Figure 2. Number of breeding pairs of Cory's Shearwater (a), number of fledglings per pair of Cory's Shearwater (b) and number of feral rabbits withdrawn (c): Frioul Archipelago (Marseilles, France).

The decrease in the number of breeding pairs between these two periods is c. 25%. The number of young that leave the colony each year has diminished c. 33%. Before the introduction of the rabbit Cory's Shearwater was increasing on Frioul (*c.* 30% in 6 years) and its breeding success was stable (annual average: 0.84 ± 0.08 fledgling/pair). The global decline of the shearwater colony that occurred afterwards conceals important variations from one year to another (annual average: $50.7\% \pm 9.9$ breeding pairs and average annual breeding success: 0.63 ± 0.15 fledgling/pair).

Discussion

The Calanques Range stretches to the South of the City of Marseilles from West to East. Off the steep coasts of these hills is found the Riou-Maïre Archipelago which consists of 5 major islands, all uninhabitated (Figure 1).

Together with the Frioul Archipelago these islands are a sanctuary for seabirds. Four species breed on them: Yellow-legged Gulls *Larus cachinnans,* Storm Petrels *Hydrobates pelagicus,* Mediterranean Shearwaters *Puffinus yelkouan* and Cory's Shearwater (Guyot *et al.* 1985). On the Frioul Archipelago there is no evidence for the presence of the Storm Petrel and the number of Mediteranean Shearwaters is reduced to 1-2 pairs. Before the decline of the Frioul colony the Cory's Shearwater population of the two archipelagos numbered between 220 and 260 pairs. The only other breeding population on the Mediterranean coast of continental France is found in the Hyères Archipelago, *c.* 75 km East-South-East of Marseilles: it is estimated at between 195 and 245 pairs (Guyot *et al.* 1985). Thus the island off Marseilles shelter between 50 and 55% of all Cory's Shearwaters nesting on the Provence coast (*c.* 18% on Frioul and *c.* 34% on Riou-Maïre).

All the islands off Marseilles are of great importance for the conservation of seabirds, and especially the Procellariiforms, in the North-Western Mediterranean. Strict measures should be taken to protect the shearwaters and petrels that breed on these islands. This cannot be done without active management to reduce the ecological imbalances due to human interference. Rabbits, for example, have non only been introduced on to Pomègues but also on to the Riou-Maïre Archipelago (Cheylan 1984). This applies not only to the conservation of sea bird colonies but also to the whole insular ecosystem which is more or less heavily damaged, depending on the islands (the most degraded being Ratonneau because of the permanent human occupation and, to a lesser extent, Pomègues).

The campaigns of rabbit control on Pomègues Island are the first such steps undertaken. Though they have not prevented the decrease of Shearwaters they have contributed to limit this decline. Without human intervention it is possible that shearwaters would have been eliminated from these islands by the rapid increase of the rabbit population. The withdrawals that are carried out each year are not able to eradicate these mammals but keep them from

exploding demographically. Had things taken their course "naturally" Cory's Shearwater would probably have disappeared from Frioul and its breeding population on the Provence coast would have been reduced by 18%.

Although imperfect the regulation of the feral rabbit population will continue on Frioul. For the near future ferreting and shooting will continue to used, but more efficient solutions are being sought. Poisoning has been tested on rabbits on different islands around the world (Imboden 1987, Chapuis *et al.* 1991 and pers. comm.) and could prove to be the right method for the islands off Marseilles.

Acknowledgements — We would like to thank the *Fédération Départementale des Chasseurs des Bouches-du-Rhône* and the three local Marseilles hunting clubs for their active help in the limitation of the Frioul rabbit population as well as the *Services Techniques* of the City of Marseilles for their assistance.

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Avocetta N° 16: 71-72 (1992)

Les programmes de marquage de Laridae avec bagues colorées en Mediterranée

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Il y a trois ans, MEDMARAVIS s'inquiétait de la prolifération et de la diversité des programmes d'identification d'oiseaux marins à l'aide de marques colorées. Constatant la désinvolture de certains bagueurs - voire méme de centres ou d'organismes de baguage - pour de telles opérations, MEDMARAVIS décidait d'entreprendre la lourde tâche du recensement des différents codes appliqués: travail ingrat et peu commode puisque trop de personnes ont négligé de répondre aux multiples courriers ou annonces.

L'effort de plusieurs d'entre nous est cependant fort louable car il nous permet aujourd'hui de dresser l'inventaire succint (Table 1) des informations recueillies: dans les 10 dernières années, 49 programmes ont été identifiés, ponctuels, temporaires ou en cours, impliquant 12 pays et concernant 12 espèces.

Ces programmes, nationaux ou particuliers, appliquent des codes fort variés pour identifier les oiseaux, jouant essentiellement sur la pose de bagues plastiques colorées (uniques ou multiples) gravées ou non de symboles (lettres ou chiffres). Rares sont ceux qui utilisent des plaques ou des fanions alaires.

Parmi les espèces impliquées, le Goéland leucophée *Larus cachinnans* retient le plus l'attention sur ses sites de reproduction ou d'hivernage puisque 13 programmes le concernent.

Et pourtant, malgré le soin déployé par les observateurs pour relever minutieusement la disposition, les couleurs et les inscriptions des marques rencontrées sur le terrain, bon nombre d'oiseaux nous sont signalés porteurs de codes encore inconnus et les responsables ne peuvent être prévenus. Ainsi plusieurs *Larus audouinii, Larus*

Table 1 - Nombre de programmes de marquage pour chaque pays.

Espèces/Pays	C.E.I.	POL	D	DK	NL	B	GB	F	E	GIB	P	I	Total
Larus argentatus			1	1	1		2	1					6
Larus marinus							1	1					2
Larus cachinnans					1	1		1	4	1		5	13
Larus fuscus					1		2						3
Larus genei												1	1
Larus andouinii									4				4
Larus canus				1	1		1						3
Larus ridibundus	1			1		2	1	1	1				7
Larus melanocephalus					1			1				1	3
Rissa tridactyla								1	1				2
Sterna albifrons		1			1			1			1		4
Chlidonias hybrida												1	1
Total	1	1	1	3	6	3	7	7	10	1	1	8	49

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cachinnans ou *Larus fuscus* vus au Maroc, en Espagne, en Italie ou en France restent toujours sans "propriétaires".

Cet état de fait est déplorable à plus d'un titre. En effet, l'intérêt de mener de telles actions dans l'anonymat total nous parait non seulement dénué de tout fondement vraiment scientifique, mais encore particulièrement dangereux par le risque encouru de souiller, ruiner ou dupliquer des programmes déja en cours. Sans parler de l'information perdue ou de la lassitude que cela peut engendrer chez les observateurs de terrain pour relever des indices dont la transmission ne sera suivie d'aucun effet!

Puissent les efforts consentis par MEDMARAVIS pour pallier ces carences inciter tout lecteur averti de l'application ou de la préparation de programmes colorés dans une région d'en prévenir rapidement et directement:

P.C. BEAUBRUN / MEDMARAVIS
Ecole Pratique des Hautes Etudes
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Tel: 67.14.32.90 Fax: 67.63.33.27

Toutes nos informations sont centralisées à cette adresse. Vous trouverez conseils sur la marche à suivre pour mettre correctement en oeuvre de nouveaux programmes et on vous informera des personnes à joindre pour signaler vos trouvailles. De la participation active de chacun d'entre nous dépend la pleine réussite d'actions scientifiques dont l'intérêt est certain.

Nous insistons sur le fait que la démarche entreprise par MEDMARAVIS ne se subsitue en rien aux actions officielles des istitutions responsable du baguage des oiseaux. Dans tous les cas, l'autorisation de pose de bagues colorées dans un pays ne relève que de l'acceptation des centres nationaux.

Avocetta N° 16: 73-74 (1992)

Preliminary results of ringing Mediterranean Gulls *Larus melanocephalus* breeding in the Netherlands, Belgium and Italy

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The number of breeding Mediterranean Gulls has increased markedly in north-western Europe during the past ten years (Meninger and Bekhuis 1990) and in Italy since the first settlement in 1978 (Boldreghini et al. 1986).

At present, over half of the northern, still relatively small, population breeds in the Netherlands (c. 120 pairs in 1991, c. 75 pairs in 1992) and Belgium (c. 25 pairs in 1991, c. 50 pairs in 1992); the population breeding in Italy amounts to c. 1400 pairs in 1991 and c. 900 pairs in 1992 (Figure 1).

To obtain information on population dynamics and movements, a ringing programme was started in both areas. Between 1989-92 330 Mediterranean gulls were ringed in the Netherlands and Belgium, 179 of which were also ringed with a WHITE, engraved darvic (PVC) ring. In Italy about three thousand chicks have been ringed since 1978; in 1990-92 463 of them were also marked with a BLUE, engraved PVC ring (Table 1).

In north-western Europe, the recovery rate of colour-ringed birds was remarkably high (Table 1). By 1st September 1992, 53% of the birds ringed as adults and 31% of the birds ringed as chicks in 1990-92 were resighted away from the ringing site at least once. First year birds (1st year running from hatching to 30 June of the next year, >1cy subsequently) have hitherto been resighted predominantig west of their natal areas, mainly in northwest France, southern England, Wales, with one sighting in Denmark. Birds older than one year have been resighted in southern England, Wales and along the Atlantic coast between northwest France and Morocco (Figure 2).

In Italy the efficency of the ringing programme was very low (Table 1): up to now only 2% of colour ringed birds and 1% of metal-ringed birds have been resighted or recovered away from the ringing site. It seems that there are two main areas of distribution: the upper Adriatic coast and the northern coast of the Western Mediterranean. A few individuals reached the Atlantic coast of France, three the Netherlands, one Tunisia and one the Atlantic coast of Morocco. There appeared to be

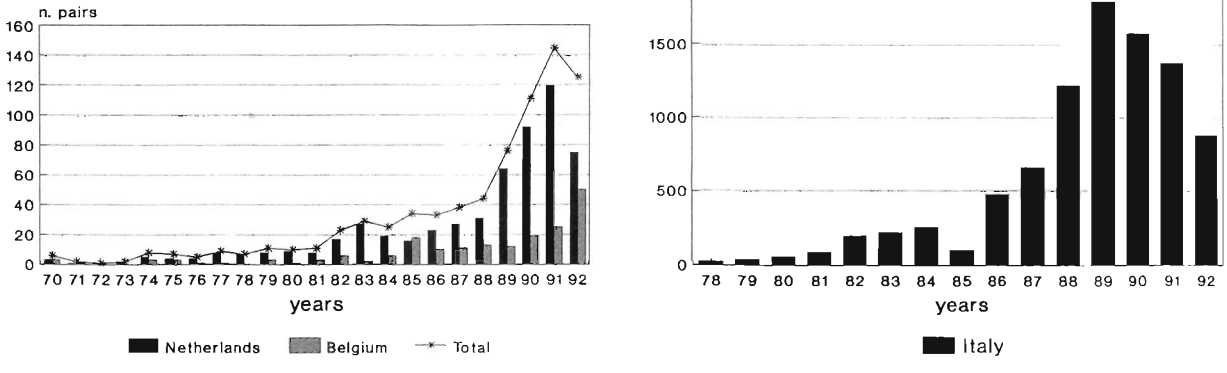

Figure 1 - Breeding population in NW Europe and Italy.

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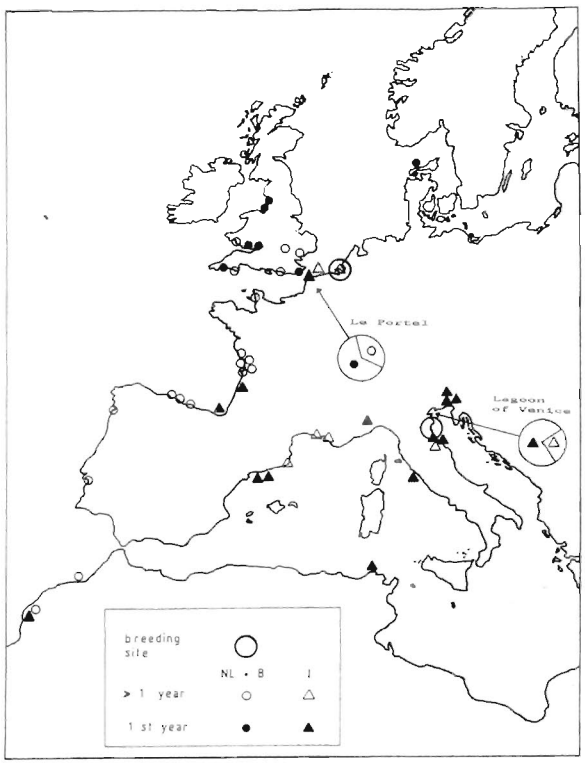

Figure 2 - Sightings of Mediterranean Gulls ringed in the Netherlands/Belgium and in Italy. In the larger circles: Le Portel, France, tot. 30 birds; Lagoon of Venice, Italy, tot. 8 birds.

Table 1 - Number of Mediterranean Gulls ringed in the SW-Netherlands (1989-92), Belgium (1992) and Italy (1978-92) and recovered until 1 September 1992 (number with colour-rings in parentheses).

	chicks					adult breeders				
	Ringed		rec.		%	ringed		rec.		%
NETHERLANDS										
1989	42	(0)				1	(0)			
1990	71	(35)	0	(11)	- (31)	23	(23)	0	(15)	- (65)
1991	79	(42)	0	(13)	- (31)	11	(11)	0	(5)	- (45)
1992	50	(27)	0	(3)	- (11)	11	(11)	0	(4)	- (36)
Tot.	242	(104)	0	(27)	- (26)	46	(45)	0	(24)	- (53)
BELGIUM										
1992	42	(30)	0	(5)	- (17)					
Tot. NL + B	284	(134)	0	(32)	- (24)	47	(46)	0	(24)	- (53)
ITALY										
1978-81	155	(0)	2		1					
1982	44	(0)	0		-					
1983	91	(0)	1		1					
1984	127	(0)	0		-					
1985	40	(0)	0		-					
1986	163	(0)	3		2					
1987	229	(0)	0		-					
1988	352	(0)	1		.3					
1989	726	(0)	4		.6					
1990	*	(102)	5	(4)	? (4)					
1991	*	(169)	2	(6)	? (4)					
1992	*	(192)	0	(0)	- (-)					
Tot.	c.3000	(463)	18	(10)	1 (2)					

* data not yet fully available.

no difference between first year birds and older ones (Figure 2).

There is no indication (as yet) that birds ringed in north-western Europe enter the Mediterranean whereas there is at least some flow from the Po Delta to north-western Europe (including birds establishing as breeders).

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P. Brichetti and U.F. Foschi provided us with data referring to the breeding population in the Comacchio lagoon and F. Spina (INFS) supplied part of the recovery data.

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Avocetta N° 16: 75-76 (1992)

The use of salinas by breeding Charadriiformes: two italian cases

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Introduction

This research was carried out during the 1988 breeding season in order to obtain information to be used to improve conservation measures for Recurvirostridae in Italian natural reserves.

Study areas

The Salina di Cervia, 44° 15'N 12° 21' E, surface 827 ha, is a complex of pans, most being little more than 1 ha, with vegetated banks and small emergent mudflats; depth varies from a few to 50 centimetres depending on the productive cycle. The vegetation is nairly alophilous: *Arthrocnemum* sp., *Salsola soda*, *Halimione portulacoides*, *Limonium* sp., *Ruppia spiralis* and Chlorophyceae; the area is surrounded by cultivated land and there are also inside. The Salt-pan is a State natural reserve, a Ramsar site and hunting is forbidden. The average tonnage of salt produced is 50.000/year. *Artemia salina* is present but not exploited.

The Salina di Margherita di Savoia, 41° 25'N 16° 06'E, surface 4000 ha, is a complex of pans where the erosion of internal banks and the scarce bank remoulding has recently caused the junction of several basins. At present the basins used by breeding Charadriiformes are mainly very wide (10-100 ha). The depth varies from a few centimeters to 1.5 metres. Main vegetation is alophilous: *Suaeda fruticosa*, *Arthrocnemum* sp., *Halimione* sp., *Limonium* sp., *Ruppia* sp., Chlorophyceae; *Phragmites australis* and *Juncus* sp. are locally common in marginal areas. The Salt-pan is a State natural reserve, a Ramsar site and hunting is forbidden but poaching is scarcely controlled. The average tonnage of salt produced is 500.000/year. *Artemia salina* is present but not exploited; the water storage basins are exploited throught extensive fish-culture.

In both Salt-pans active conservation and management programmes have been planned but until now not applied.

Results

The two Salt-pans are important breeding areas for Charadriiformes (Boldreghini *et al.* 1989, Tinarelli, in press), in particular for the following species: *Recurvirostra avosetta* (40% of the Italian population), *Himantopus himantopus* (15%), *Sterna albifrons* (11.3%), *Charadrius alexandrinus* (6%), *Larus genei* (3.5%) (Italian populations after Fasola 1986, Tinarelli and Baccetti 1989).

Data on the breeding populations are reported in Table 1.

The average number of species per colony and the average size of colonies are not significantly different (U Mann-Whitney) between the two salt-pars. The association among colonial breeders (Figure 1) is different in the two salinas depending on ecological conditions.

In the Cervia salt-pan the colonies are located mainly on emergent vegetation and mudflats inside basins with low water levels or at the base of the banks. Only 12% of the *Recurvirostra avosetta* population and 20% of the *Sterna albifrons* population breed on the top of banks without vegetation, whereas all *Larus cachinnans* breed on the top of banks and islands with good vegetation cover.

In the Margherita di Savoia salt-pan the colonies are located mainly on the top of banks and bank remains with scarce or absent vegetation inside wide and deep basins. Only *Himantopus himantopus*, *Tringa totanus* and *Gelochelidon nilotica* nearly always breed inside smaller basins on slightly emergent, vegetated or muddy islands.

The number of species per colony is significantly correlated (Spearman's correlation coefficient) with the colony size both at Cervia ($rs = 0.88$, $p < 0.01$) and at Margherita di Savoia ($rs = 0.72$, $p < 0.01$).

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Table 1 - Data on breeding populations

	CERVIA SALT-PAN					MARGHERITA DI SAVOIA SALT-PAN				
	no. pairs	no. colonies	pairs/colony mean	sd	single pairs	no. pairs	no. colonies	pairs/colony mean	sd	single pairs
Himantopus himantopus	97-131	8	13.8	9.3	4	46	5	9.8	9.4	0
Recurvirostra avosetta	87-101	7	15.7	12.8	2	304-521	21	23.2	23.9	0
Charadrius alexandrinus	25-30	5	4.2	3.8	15	60-80	5	7.6	6.5	35
Tringa totanus	1				1	2-5	2	2.5	0.7	0
Larus cachinnans	13	2	6	5.7	1					
Larus genei						40-45	2	30	4.2	0
Sterna albifrons	250-280	6	46.5	73.5	1	348-514	18	27.4	23.8	3
Sterna hirundo						1				1
Gelochelidon nilotica						2-3	1	2		1
total no. colonies			15					27		
average no. species/colony			2.53 (sd 1.30)					2.41 (sd 1.01)		
average no. pairs/colony			36.13 (sd 58.71)					42.44 (sd 45.16)		

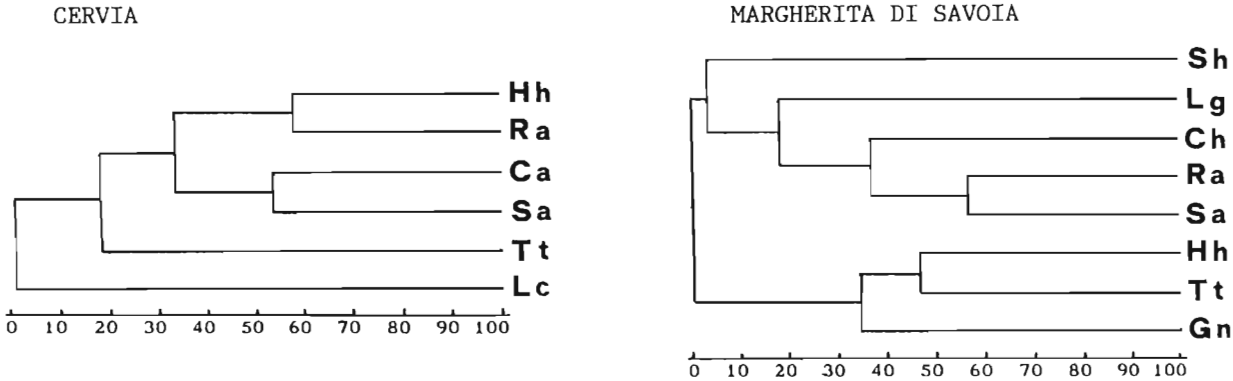

Figure 1 - Dendrogram of the association among colonial breeders. Proportional similarity index (Colwell and Futuyma, 1971) calculated employing maximum numbers per colony.

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Avocetta N° 16: 77-80 (1992)

Birds and habitat conservation on Chios, Greece

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Abstract — In this attempt to describe birdlife in Chios Archipelago we recorded 211 species, most of which are migrants and visitors. Large concentrations of birds appear during migration and suffer a heavy hunting pressure (shooting and liming). The most important bird areas are Psara and Dotia with mainly bushy vegetation. The authors propose the establisment of a marine and island park in Psara-Antipsara archipelago for the protection of birds during migration.

Introduction and methods

This is the first attempt to describe birdlife in the Chios Archipelago, based on authors' records from as far back as the 1940's. Observations were made regularly but without precise counts. Frequent inspection of the illegal but intensive bird trade on Chios market, involving millions of live and dead birds, has also provided useful information (Choremi *et al.*, 1993). Observations on seabirds, water-birds and diurnal birds of prey are probably incomplete, but does not seriously affect the general picture of the birds of Chios presented in this paper. 211 bird species have been observed, of which 94 were passage migrants, 71 can be classed as visitors, 20 as wintering, 22 as breeding and only 18 resident species (with some species in more than one category). The highest species diversity is to be found during migration seasons (Figure 1), especially in April (110 species), September (86) and October (88). This is due to the fact that all the autumn visitors also occur in spring, with the addition of certain species occuring in the only spring (e.g. herons). At the same time, 17 of the 22 breeding summer visitors have arrived in April.

Results and discussion

Migration season (Autumn 15 Aug-15 Nov, and spring 1 Mar - 15 May)

The autumn passage takes place with light winds from the north and west, never with winds from the south. Shrikes *Lanius* are the only species requiring perfectly calm conditions. Important arrivals take place after rainy weather which coincides with light north winds. Small insectivorous passerines, Turtle Doves *Streptopelia turtur* and Quails *Coturnix coturnix* arrive before dawn at around 4:00-5:00 a.m., while seed-eating passerines arrive and are mainly on between 9:00 or 10:00 and 14:00 hours. All passerines appear to arrive on the island of Chios from the south, while in fact they are heading south, and approach Chios flying against the north wind. The only exception to this rule is the Spanish Sparrow *Passer hispaniolensis*. Mass departure in flock are seen only in the case of insectivorous birds, such as swallows from towns. *Phylloscopus* warblers concentrate at rocky headlands (such as Dotia) in the evening at about 18:00-20.00 hours, and make one or two "test departures" before actually leaving. Quails depart from the hillside at Dotia and Gridia. The number of migrants during autumn is much greater than during spring, when on the other hand the variety of species is higher (62 species in April vs. 49 in September).

Several migrants are threatened, and are included in the Greek Red Data Book (Handrinos G., in press): e.g. the Glossy Ibis *Plegadis falcinellus,* the Purple Heron *Ardea purpurea,* the Lesser Kestrel *Falco naumanni,* the Collared Pratincole *Glareola pratincola,* the Black Tern *Chlidonias niger,* the Roller *Coracias garrulus,* and the Ring Ouzel *Turdus torquatus.*

Bird recoveries from Chios 1930-91

There are 63 ring recoveries from Chios and 1 from Psara, involving 23 different species (16 passerines) originating from 17 countries (Finno-Scandia and-Central Europe). The most commonly recovered bird in Chios is the Red-backed Shrike *Lanius*

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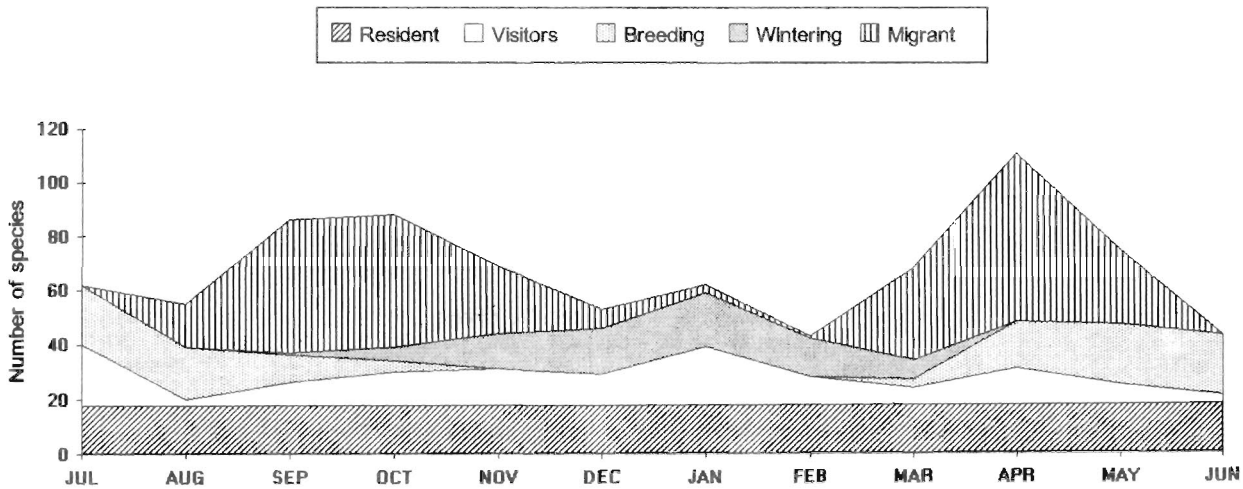

Figure 1 - Presence of birds on Chios by months.

collurio (n = 13) ringed in Germany, Sweden, Czechoslovakia and Finland, followed by the Blackcap *Sylvia atricapilla* (n = 8) ringed in Sweden, Czechoslovakia, Hungary, Poland and Romania.

Wintering period (20 Nov. - beginning of March)
Thrushes (*Turdus* spp) appear to arrive from the east, that is from coast of Asia. The minor number of birds that ultimately stay to winter on the island is high when there is a good crop of olives. The number of Woodcocks *Scolopax rusticola* increases when the tops of the mountains on the mainland opposite Chios are snowcovered.

Breeding season (beginning of March to October)
Some species nesting on Chios are of concern because of their restricted distribution in the rest of Europe, such as the Black-headed Bunting *Emberiza melanocephala,* the Rufous Bushchat *Cercotrichas gala ctotes,* and especially the Masked Shrike *Lanius nubicus,* which is a threatened species included in the Greek Red Data Book
The special arrival pattern of Black-headed Buntings is worth mentioning: flocks of males arrive first and this continues for several days, then flocks of females begin to arrive.
The fact that no aquatic species nest on the island is certainly due to the presence on Chios of only small and degraded wetlands, which are subject to a high degree of disturbance and, especially, dry up from May-June onwards. The Moorhen *Gallinula chloropus* might be able to breed on the island were it not for disturbance. The nesting of a pair of White Storks *Ciconia ciconia* for the first time in 1989 was a great surprise, but the whole family was shot.

Resident species
The marked movements around the island of the local population of Great Tits *Parus major* in September-October are of interest. The Shag *Phalacrocorax aristotelis,* which breeds on the coast, is a threatened species included in the Red Data Book. Three sedentary species are in dramatic decline: the Raven *Corvus corax,* the Rock Dove *Columba livia* and the indigenous Chukar *Alectoris chukar cypriotes.* The Rock Sparrow *Petronia petronia* included in the Red Data Book is also threatened in Chios by liming. The Collared Dove *Streptopelia decaocto* colonized Chios in 1936.

Visitors
Water birds (wader, duck, geese) make their appearance only when there is a combination of severe cold, snow, strong, northerly winds and rough seas. They arrive in flocks at dawn, flying from a southerly direction and may continue to arrive all days. When lakes in Turkey are frozen, the number of such birds increases steeply, irrespective of weather conditions on Chios. It is worth noting the occurence of certain species which are included in the Red Data Book, such as Greylag Geese *Anser anser* in small numbers, and also birds of prey, including the Buzzard *Buteo buteo,* the Long-legged Buzzard *Buteo rufinus* and Bonelli's Eagle *Hieraaëtus fasciatus.*

Threats to the birds of Chios
Shooting with firearms or air rifles, legally or illegally, is prevalent throughout the island. It regularly amounts to mass killing, especially of migrant species and threatens 102 out of the total

211 species on the Chios bird list. There are 4500 holders (1989) of a shooting licence on Chios, representing 8% of the total population of the island (Choremi *et al*, 1993). This compares to the total number of shooting licences in Greece, which is 350 000 (3,5% of the total population).

Liming is a very old tradition on the island: Twigs covered with a sticky substance, containing the pulp of the Assyrian Plum *Cordia myxa* as the basic ingredient, are placed on suitable supporting structures to cach birds. This is a non selective mass destruction to which an enormous number of birds of 72 different species falls victim every year. It is especially common along the SE coast of Chios.

Two areas are particularly important for birds in the Chios Archipelago (Figure 2).

Dotia is a hilly range (up to 600 m in altitude) and a valley at the southermost tip of the island. It attracts large numbers of hunters in September. The following species recorded at Dotia, included in the Red Data Book, are worth mentioning: Stone Curlew *Burhinus oedicnemus,* Roller, and Night Heron. The Little Bittern, Wryneck *Jynx torquilla,* Sedge Warbler *Acrocephalus schoenobaenus,* Woodchat Shrike *Lanius senator,* White Stork, Short-toed Lark *Calandrella brachydactyla,* Thrush Nightingale *Luscinia luscinia,* and Stonechat *Saxicola torquata.*

Psara is an island (39 km^2) with mainly bushy vegetation and few trees. Shooting pressure is high in the autumn because of large numbers of Golden Orioles *Oriolus oriolus,* and Bee-eaters *Merops apiaster,* and in the winter for waterfowl and waders. Hunters camp on the island. There is a large lighthouse against which many migrants collide and are killed. The situation is aggravated by the lack of suitable areas where birds can take refuge, owing to the scantly vegetation and the small size of the island. The nearby small island of Antipsara is also visited by hunters and this results in heavy disturbance and stealing of young from the nests of Eleonora's Falcon *Falco eleonorae.*

Conservation

The control of hunting is urgently needed, especially on Psara and Dotia. A change of the first day of the hunting season from the present August 20 to the 5th of September would benefit those species in which the main body of the population has by then departed from Chios: the Redbacked Shrike, Lesser Grey Shrike *Lanius minor,* Willow warbler *Phylloscopus trochilus,* Chiffchaff *P. collybita* and the Wheatear *Oenanthe oenanthe.* The closing date of the hunting season should be also moved from the 10th of March to the 28th of February. This would benefit the breeding of the indigenous Chukar which starts at about this time. Environmental education efforts, which have already started on Chios, must continue.

A marin and island park should be established on Psara and Antipsara. The small population of five Monk Seals *Monachus monachus* would thus find protection (pers. comm. Anda Vlachoutsikou, 1990). Bird watching tourism would increase local income and gain support for the idea of the park among the inhabitants.

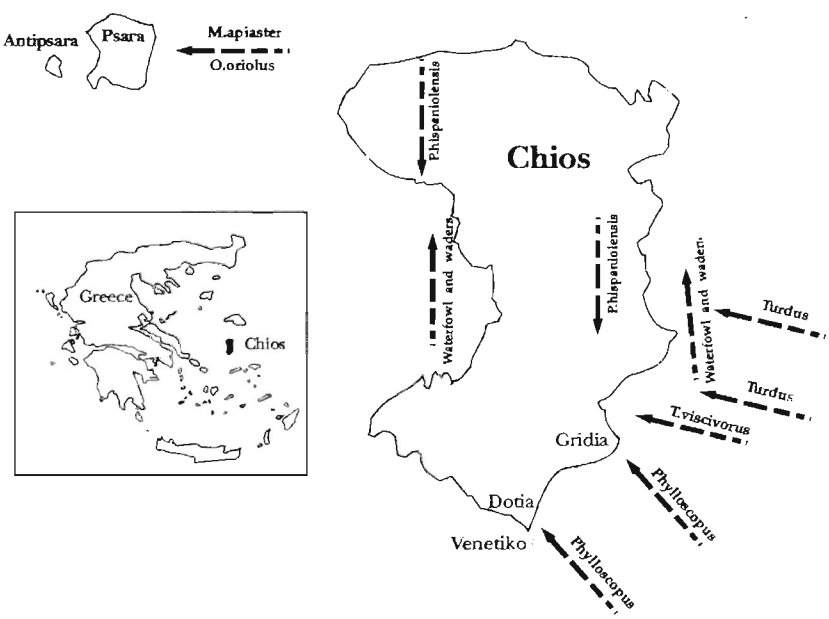

Figure 2 - Important bird areas of Chios.

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Habitat use in Yellow-legged Gull *(Larus cachinnans michahellis)* coastal wetland colonies of North-East Greece

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Abstract — Yellow-legged Gull habitat use was studied at two colonies situated on lagoon islets (Lafri and Karatza) in North-East Greece. At the Lafri colony most nests (74.3%) were in high cover (>70%, overall average 78%). Sand dune and ruderal vegetation were avoided in preference for halophytic communities of *Halocnemum strobilaceum* (HS) and *Halimione portulacoides - Arthrocnemum fruticosum* (HP-AF); both were used in proportion to their availability. Both vegetation cover and type were important for nest placement and spacing. At the Karatza colony most nests (78.1 %) were in high cover (average 85 %). The most important plant communities were *Asparagus tenuifolius* (dominant) and HP-AF; both were used in proportion to their availability. In this colony vegetation cover seemed to be more important than vegetation type. This allowed a better breeding synchronization than at Lafri. Aspects of Yellow-legged Gull habitat use in the wider area are discussed.

Introduction

Vegetation is a primary factor in marsh nesting bird habitat selection (Burger 1985). Ground nesting species, such as gulls and terns, frequently breed in association with particular vegetation types, which provide shelter for adults and chicks against predation, sun, wind and rain and give nest site recognition cues (Blokpoel *et al.* 1978, Burger and Lesser 1978, Becker and Erderlen 1986). However, vegetation encroachment may have several adverse effects on nesting species, by preventing visual contact and social facilitation, and by limiting landing sites, leading finally to desertion (Massey 1974, Goutner 1986, Kotliar and Burger 1986). It may consequently be possible to attract or discourage several species from particular breeding sites through the management of vegetation (Morris *et al.* 1980, Saliva and Burger 1989). The Yellow-legged Gull *(Larus caehinnans)*, like its relative the Herring Gull *(Larus argentatus)* in the Atlantic, has increased considerably in some parts of the Mediterranean, displacing rare species such as Audouin's Gull through competition (Bradley 1986, Monbailliu and Torre 1986). Management of Mediterranean coastal wetlands and their colonial waterbird population needs information on the habitat requirements for each species. In the Mediterranean this has been obtained by Fasola (1986), Fasola *et al.* (1989), Fasola and Canova (1991, 1992), but quantitative information is still needed for Yellow-legged Gulls given the great plasticity of habitat selection in this species.In this paper I describe vegetation structure in two Yellow-legged colonies for the first time in Greece.

Study area

The two study colonies were situated on islets in the "Lafri" and "Karatza" lagoons, within a vast coastal wetland complex of eight lagoons and two freshwater lakes in North-Eastern Greece. All the lagoons in this area are managed as fisheries. The study sites are 12.6 km apart and, in 1987, they were the only breeding areas of Yellow-legged Gulls in this wetland system.

The Lafri islet (7.50 ha) was mainly covered by halophytic vegetation (Figure 1). Its banks were steep except at the far western edge. The Karatza islet (0.61 ha) had a relatively steep slope and was covered by dense vegetation (zone A in Figure 1). There was a vegetation-free area (B in Figure 1) and a dike-shaped edge (C in Figure 1) at the north-east.

Methods

The study sites were visited during the first ten days of May 1987, during the late incubation to early hatching stage of Yellow-legged Gulls. Vegetation

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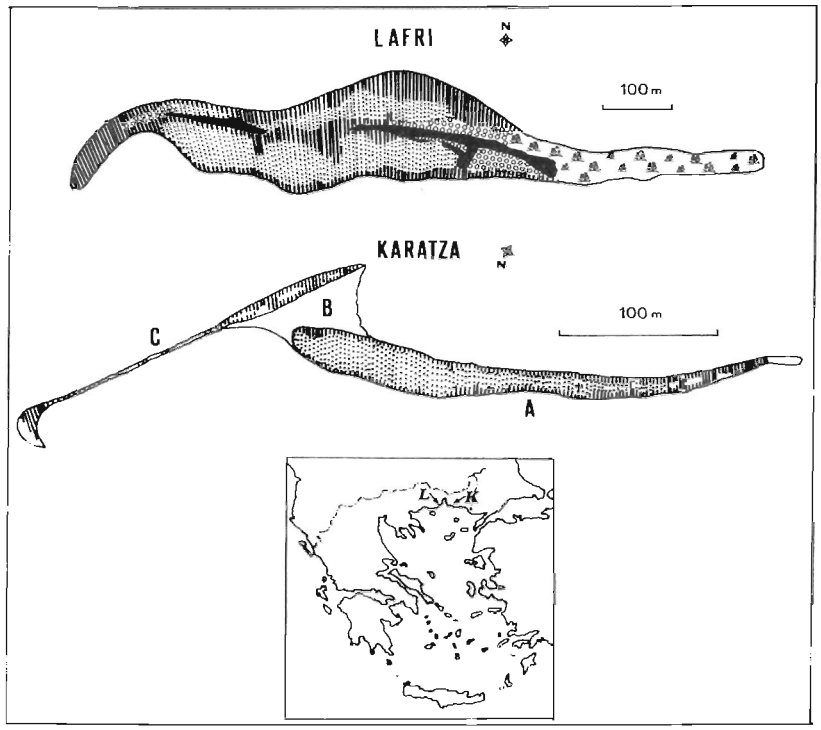

Figure 1. Map of the study islets at Lafri and Karatza Lagoons. Lafri: Hatching: *Halimione portulacoides - Arthrocnemum fruticosum* community. Dotted: *Halocnemum strobilaceum* community. Black: dense ruderal vegetation. Circles: *Artemisia monogyna - Limonium gmelinii* community. Plant symbols: dune associations.
Karatza: Hatching: *Halimione portulacoides - Arthrocnemum fruticosum* community. Dotted: *Asparagus tenuifolius* (mainly) area.
A, B and C are subdivisions described in the text.

cover was measured at nest sites using a 1 m^2 grid divided into 25 squares, each 20 X 20 cm. This method is frequently used in the study of vegetation and/or habitat preferences of gulls and terns although the size and shape of the grid used varies (Blokpoel *et al.* 1978, Kotliar and Burger 1986, Goutner 1987, Storey 1987, Goutner 1990, Fasola and Canova 1992). The central square was placed over each nest at a random orientation. Total cover and plant species were recorded. Distance from the nearest conspecific and distance to water were measured to the nearest cm. Two categories of distances from water were distinguished: one "close to water" and another "far from water". Adapting each category to the scale of each islet, for Lafri "close to water" was ≤ 10 m whereas for Karatza it was ≤ 5 m; "far from water" was >10 m and >5 m respectively. At Lafri all the nests found were measured. At Karatza data were collected for 163 (74 %) of the 221 nests in the colony portion A (Figure 1). The non-recorded part of the colony (B in Figure 1) was occupied by late or displaced breeders and their habitat choice might have been biased. In order to compare used and available vegetation I mapped the vegetation of each islet during visits in May and early June 1987.
Statistical tests were performed on arcsine and log transformed data for percentage vegetation cover and distance from nearest conspecific, respectively.

Results

Lafri

Most nests were found in high vegetation cover, 74.3% were in cover categories >70% (Table 1). Average nest cover was 78% (range 20-96%). Twenty three plant species were found around nests (Table 2). With the exception of plants of the Family Poaceae, dominant halophytes were *Halocnemum strobilaceum* (HS), *Halimione portulacoides* (HP) and *Arthrocnemum fruticosum* (AF). Other plants were mainly minor components of the vegetation in the samples. Vegetation mapping showed that the most widespread plant community was *Halimione portulacoides - Arthrocnemum fruticosum* covering most of the periphery (except the eastern side) and a strip along the middle of the islet (Figure 1) and a *Halocnemum strobilaceum* community covering

most of the inland portion of the islet. Both were similar in extent (Table 3). The eastern part was dominated by sand dune vegetation (*Eryngium* sp., *Anchuca* sp. etc). A strip from the mid-central to south east portion was covered by dense, high ruderal vegetation. Another minor portion was covered by an *Artemisia monogyna - Limonium gmelinii* community. Comparison with the nest vegetation data suggests that:

Sand dune and dense ruderal vegetation were avoided by nesting birds in preference for halophytic marshland.

Although HS alone was more frequent around nests, when samples with HP and/or AF are taken together (as they are the main constituents of their association, Babalonas 1979), their frequency is 49.5 % and this value is not far from that of HS (55.2%). This may mean that at least on a plant community level, the two major communities were used in proportion to their availability.

The mean % cover around nests made in HS alone was significantly higher than around nests in HP and/or AF ($F = 9.99$, $P = 0.003$, ANOVA, Table 4). Mean distance from nearest conspecific was significantly greater at nests made in HS ($F = 6.62$, $P = 0.014$, ANOVA, Table 4). When comparing all samples which simply contained HS to all containing HP and/or AF, mean % cover was still significantly different ($F = 3.38$, $P = 0.012$, ANOVA) whereas mean nearest conspecific distance did not differ significantly ($t = 1.60$, NS, t-test). There were significantly more nests close to water in the HP-AF community ($\chi^2 = 5.29$, $P = 0.02$, and $\chi^2 = 4.33$, $P = 0.04$, respectively, Table 4).

Karatza

In this colony too, most nests (78.1%) were surrounded by very high (>70%) vegetation cover (Table 1). Average nest cover was 85% (range 0-96%). Vegetation composition was somewhat complex here. A relatively high elevation (up to 1 m) allowed a variety of non-halophytic species to develop. On the other hand, the typical halophytic community of salt-water moistened ground, HP-AF, also appeared here. The dominant plant around nests was the bushy *Asparagus tenuifolius* (AT) and Poaceae were second in frequency, with HP following. All halophytes occurred at a frequency of >10% (Table 2). Samples containing HP and/or AF were 42.9% of the total, which is considerably lower than the AT frequency (60.1%). Mapping of the islet vegetation showed that AT was dominant both in the main colony area (A in Figure 1) and over the whole islet (Table 3); AT and HP/AF were used in proportion to their availability.

Mean % cover of nests made in HP-AF was similar to that of those made in AT ($t = 0.24$ NS, t-test, Table 4). Mean distance from nearest conspecific was shorter at the latter nests but not significantly different ($t = 1.40$ NS, t-test, Table 4). The number of nests made close to and far from water differed significantly between nests made in AT and in HP-AF ($\chi^2 = 7.73$ $P = 0.005$, Table 4).

Table 1. Vegetation cover near nests of Yellow-legged Gulls in Lafri (105 nests) and Karatza (205 nests).

	% frequencies	
% Cover categories	Lafri	Karatza
0-30	1.8	21.9
31-40	2.9	1.0
41-50	6.7	1.9
51-60	4.8	3.4
61-70	9.5	3.4
71-80	25.7	12.7
81-90	18.1	11.2
91-100	30.5	44.4

Table 2. Plant frequencies at nests of Yellow-legged Gulls at Lafri (N = 105) and Karatza (N = 163)

	% frequency	
Plant species	Lafri	Karatza
Asparagus tenuifolius	-	60.1
Halocnemum strobilaceum	55.2	-
Halimione portulacoides	33.5	38.0
Arthrocnemum fruticosum	29.5	15.9
Matricaria sp.	1.9	28.2
Juncus sp.	-	15.9
Bromus sp.	1.9	12.3
Limonium gmelinii	19.0	11.0
Artemisia monogyna	9.5	14.1
Festuca sp.	9.5	-
Fumaria officinalis	-	8.6
Geranium sp.	-	6.1
Bolboschoenus maritimus	-	6.1
Asphodelus microcarpus	0.9	3.7
Ephedra sp.	-	2.4
Aeluropus littoralis	3.8	-
Salicornia europaea	1.9	-
Sulsola kali	1.9	-
Lamium amplexicaule	1.9	-
Trifolium sp.	1.9	-
Senecio jacobaea	1.9	1.8
Ammophila arenaria	-	1.2
Moehringia trinervia	0.9	-
Galium aparine	0.9	-
Geranium sp.	0.9	-
Tamarix sp.	0.9	1.2
Onopordum sp.	0.9	11.7
Ornithogalum sp.	0.9	-
Plantago sp.	-	0.6
Atriplex sp.	-	0.6
Other (Poaceae)	21.8	50.9

Table 3. Surface percentages of different vegetation types on the two study islets at Lafri (7.50 ha) and Karatza (0.61 ha).

Habitat type	Lafri	Karatza	
		Part A (Figure 1)	Whole islet
Halimione portulacoides			
Arthrocnemum fruticosum	36.0	32.4	29.6
Halocnemum strobilaceum	33.4	-	-
Dune vegetation	16.5	-	-
Artemisia monogyna-Limonium gmelinii	7.2	-	-
Ruderal vegetation	6.9	-	-
Asparagus tenuifolius	-	65.1	40.8
Vegetation free areas	-	2.5	29.5

Table 4. Parameters at Yellow-legged Gull nests in the main plant communities at the two colonies. Sample is given in parenthesis.

Plants around nests	*Average* % Cover		Nearest neighbour distance		No of nests at distance from water <=10 m	>10 m
LAFRI						
H. strobilaceum only	82	(17)	653	(246)	10	18
H. portulacoides and/or A. fruticosum only	67	(17)	466	(17)	14	4
H. strobilaceum (in all samples except with HP and/or AF)	81	(41)	659	(39)	17	23
HP and/or AF (in all samples except with *H. strobilaceum*)	73	(35)	533	(35)	21	13
					No of nests at distance from water <=5 m	> 5 m
KARATZA						
HP and/or AF (all samples except with *A. tenuifolius*	86	(44)	287	(44)	22	22
A. tenuifolius (all samples except with HP and/or AF)	85	(70)	241	(70)	12	58

Discussion

At the Lafri colony Yellow-legged Gulls avoided dune and ruderal vegetation and preferred halophytic vegetation. Most nests near water were found in HP-AF communities and this simply reflected use of peripheral zones dominated by this community. The greater number of nests far from water which were in HS reflects the inland distribution of HS, a short bush of salty wetland plains (Babalonas 1979). HP-AF form dense low aggregations which leave almost no unvegetated spaces. The fact that we found that mean cover was significantly higher at nests in HS suggests that gulls bred near these plants, whereas in HP-AF they bred at the most uncovered sites. Mean closest conspecific distance was significantly greater at HS and this may be due to a better visibility between conspecifics, inducing a wider nest spacing. This may be important when HS alone is concerned: occurrence of other plant species near nests may well modify this effect. This may suggest that although these two plant communities were used in proportion to their availability, on a microhabitat level both cover and type of specific plant species played a role in nest placement and spacing.

At Karatza the mean distance to the nearest conspecific was considerably shorter than at Lafri. As at Lafri, distance to water distribution reflected the use of the dominant plant communities: most nests close to water were made in HP-AF and most in AT were far from water reflecting its inland distribution. Mean % cover and mean distance to the nearest conspecific were similar in both HP-AF and AT, and this may mean that in different plants birds probably selected sites where visibility was similar, a condition that may be important for social behaviour (Blokpoel *et al.* 1978). Birds in portion A (Figure 1) of the Karatza colony bred earlier and were more synchronised than at the Lafri colony as is shown by nest contents recorded on 9 and 10 May 1987: at Lafri 29.5% of nests contained only chicks, 50.5% only eggs and 20.0% both eggs and chicks. At Karatza these values were 64.0%, 19.5% and 16.5% respectively. A better synchronisation may also have resulted from the number of pairs in portion A of the Karatza colony: this was near the number that enhances optimum social facilitation in Herring Gulls (Burger 1979). As in other gulls (Burger and Gochfeld 1981), at Karatza vegetation types were not selected and were less important than cover.

In both colonies there were several common features in the vegetation selected. There seemed to be no special preference for dominant plant communities, but high nest cover was preferred. Some features in the habitat were avoided but these varied from one site to another.

Yellow-legged Gulls show a great plasticity in habitat selection. In the Mediterranean they breed in a variety of habitats from offshore islands to buildings, cultivated land and coastal wetlands (Isenmann 1975, Fasola 1986, Varela and de Juana 1986, Fasola *et al.* 1989, this study). Vegetative cover used in colony sites varies and frequently high cover is preferred (Fasola 1986, Monbailliu and Torre 1986, this study). In coastal North-Eastern Greece, Yellow-legged Gulls have bred for many years on Thassopoula, a coastal island situated opposite the Nestos Delta, 33 km from Lafri. On this island the birds have been breeding for a long time. The Lafri colony was first established in 1986 and the Karatza

colony in 1984. In 1983 Karatza islet was occupied by a Mediterranean Gull *(Larus melanocephalus)* colony which the following year was displaced by Yellow-legged Gulls. Within the vast coastal wetland complex from the Nestos Delta to Lafrouda Lagoon, apart from very limited areas in the lagoons of the Nestos Delta and Porto Lagos which are partly occupied by other breeding larids, there are no lagoon islets available other than those where the study colonies were situated. If their breeding population is increasing in the area, provided that Yellow legged Gulls have not developed the habit of using non-natural habitats in this part of their region, occupation of study islets was inevitable. If it was a movement of necessity for these gulls, it might not be expected that selected habitat is optimum. Nevertheless these birds once established, seem to have adjusted themselves to some features of the available vegetation.

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The basins of M. Emvolo salina as a bird breeding ground

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Abstract — Four waterbirds (Avocet *Recurvirostra avosetta,* Kentish flower *Charadrius alexandrinus,* Common Tern *Sterna hirundo,* Little Tern *Sterna albifrons)* breed regularly and two more species (Redshank *Tringa totanus,* Stone-curlew *Burhinus oedicnemus)* exceptionally, in the basins of M. Emvolo salina, Thessaloniki, Greece. The laying period normally begins after the irrigation of the basins. In this way, nest flooding is avoided by the birds which do not nest on the basin bottoms but only on the higher dividing dikes. If the basins are not flooded at the normal time, many nests can be destroyed. When this happens some nests may be saved by artificial elevation.

Introduction

A solar salina is a relatively flat area managed by man for salt production. The main components of a Greek salina are the evaporation ponds and the crystallizers which are shallow basins to which the saltwater is transferred. Many salinas have lagoons nearby, whose water is admitted to the basins when its salinity is higher than seawater. Salinas are themselves a kind of wetland and many birds use them when migrating, wintering or even for breeding. Problems arise when salinas management does not take the birds into account.

Study area and methods

The salina of Megalo Emvolo (Angelohori salines) (40° 29' 30''N - 22° 49' 30'' E) is located on the east coast of the Thermaikos Gulf, near Thessaloniki. The installations include the main salina (c.30 ha), where the basins are situated, and the lagoon (c.64 ha).

They are separated from the gulf by a sandy zone of varying width. West and South of the lagoon there are areas covered by halophytic vegetation, which are flooded during the rainy period and dry from early summer to mid-autumn. The extent of flooding fluctuates between dry and wet years. Thus, at the beginning of the 1991 breeding season (mid-April) there were about 17 ha of flooded ground that had almost entirely dried up early in July. On the other hand in 1992, there were about 4 ha, which dried up in early June. The area is surrounded by sandy meadows to the south and agricultural and urban land to the north and east. In the main salina, the basins are delineated by small dikes, up to c.30 cm high, whose total length is more than 10 Km.

Macrophytic vegetation is absent from the basins, with only a few marginal patches of low halophytes *(Arthrocnemum* sp., *Halocnemum strobilaceum, Salicornia europaea)* in abandoned basins or on the dikes.

Outside the cultivation period the basins are either flooded or dry according to rainfall. Thus, at the beginning of the 1991 breeding period the flooded part of the basins was c. 11 ha while in 1992 it was c.0,6 ha. The evaporation ponds cover an area of 21,1 ha of the north and east section of the main salina, and normally are irrigation with salt water in late March-early April. The crystallizers cover c. 6,6 ha in the SW part of the main salina: their irrigation takes place in late April-early May and the salt is usually collected during September and October. Work on the modernization of the salina prevented cultivation from 1989 to 1992, and the basins were only partly flooded during the breeding seasons.

During the 1991 to 1992 breeding periods complete surveys of waterbird nests took place from 24/4 to 11/8 and from 7/5 to 5/8 respectively.

Hidden Redshank nests were only occasionally found and their number was estimated indirectly from the birds' behaviour. Protective measures for some nests were undertaken (see the relative paragraph).

Results and Discussion

Eight species of Charadriiformes bred in different parts of the area: Avocet *(Recurvirostra avosetta),*

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Black-winged Stilt *(Himantopus himantopus)*, Kentish Plover *(Charadrius alexandrinus)*, Redshank *(Tringa totanus)*, Collared Pratincole *(Glareola pratincola)*, Stone Curlew *(Burhinus oedicnemus)*, Common Tern *(Sterna hirundo)* and Little Tern *(Sterna albifrons)*.

A high percentage or all the nests of Avocets, Kentish Plovers, Stone curlews, Common Terns and Little Terns were found in the area of the basins, exclusively on bare ground. In 1991, a Redshank nest was found by chance in halophytic vegetation on the margin of a basin.

The nests were found on the dikes and also at the bottom of the dry basins (Table 1). The other Avocet nests found in the area were located on the unvegetated shore of the lagoon, the Kentish Plover nests on the unvegetated shore of the lagoon, on embankments and in habitat similar to that of the Collared Pratincole, and lastly, Stone Curlew nests were found on embankments and in the sandy meadows.

The nests of Black-winged Stilt and Collared Pratincole were only found outside the basins. The nests of Black-winged Stilts were located in flooded ground with halophytic vegetation, mainly *Arthrocnemum* sp. and the nests of Collared Pratincole in dry ground covered with low halophytic vegetation, also *Arthrocnemum* sp. or in nearby bare ground. The laying period began around mid-April and nests with eggs were being found up to mid-August.

Table 1. Total number of nests at the Emvolo salina.

	1991			1992		
	basins		rest of	basins		rest of
	dikes	bottom	the area	dikes	bottom	the area
Avocet	76	42	-	16	5	30
Black-winged Stilt	-	-	49	-	-	4
Kentish Plover	77	51	16	17	14	22
Redshank		c.2	c.9	-	-	c.12
Stone Curlew	2		1	-	-	1
Collared Pratincole	-	-	-		-	8
Common Tern	56	2	-	48		-
Little Tern	53	35	-	2	3	-

Influence of flooding on nesting

The basins were only partly flooded during the 1991-1992 breeding seasons and many birds nested on their bottoms. In early June 1991 it was decided to irrigate the basins in order to increase the salinity of the waters, to store them for the winter. A large part of the dikes was also flooded.

The effects were disastrous for dozens of nests and I estimated that c.44 Avocet nests, c.20 Kentish Plover nests, 1 Common Tern nest and c.22 Little Tern nests were flooded. During 1992 as in 1991, it was again decided to irrigate the basins in the middle of the breeding season. In order to save the nests in danger of flooding, I elevated 6 Avocet nests, 4 Kentish Plover nests and 3 Little Tern nests. Small mounds were made next to the existing nests (diameter of base c.65-75 cm, diameter of the top c. 30 cm and height c.30-35 cm) and the nests were transferred to the top of the mounds. The 'new' nests were accepted by all the species as they were observed to incubate. However, 4 of these nests were preyed on and it is likely that the visibility of the mounds attracted the predators. Also 2 mounds were ruined by wave action.

The high number of nests found in the basins is remarkable, in contrast with the rest of the area which is in relatively natural condition. The 4 main species nesting in the basins (Avocet, Kentish Plover, Common Tern, Little Tern) are known to prefer to nest on bare ground near water (Cramp and Simmons, 1983, 1985, Harrison 1987).

Basins are a suitable habitat for these species because vegetation is absent, water is close and the dikes form a daedalian labyrinth system of great length which is relatively safe from terrestrial predators. It is remarkable that the laying period (mid-April) begins after the artificial flooding of the evaporation ponds (late March-early April) and so, by coincidence, the flooding of nests that might be built at the bottom of the basins is avoided.

The significant decrease in the nests found during 1992 in the basins seems correlated with the small amount of ground flooded. When salt production is to be delayed, it is suggested:

a) that the basins be flooded artificially with any kind of water, to be replaced with the salt water or brine when the cultivation period starts.

b) Alternatively the basins could be completely drained and thus it may be expected that the majority of the birds will go to other parts of the area where there is water, since they prefer to nest close to water.
However, in this case it is probable many of them will not breed at all, as the area of wetland would be reduced. In the case of salinas that are only made up of basins, the wetland will entirely disappear.

c) As a final solution, the artificial elevation of unsafe nests is suggested.

Acknowledgements — Many thanks to Mr Meymaridis, foreman of M. Emvolo salina, for indispensable information and permission for the construction of the artificial nests, Mr P. Birtsas for his help in four counts, Mr N. Trigas for the English translation and Dr Th. Petanidou for information concerning the salinas.

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Avocetta N° 16: 89-92 (1992)

Armenian Gulls *Larus armenicus* in Egypt, 1989/90, with notes on the winter distribution of the large gulls

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Abstract — During a survey of Egyptian wetlands between December 1989 and late May 1990 significant numbers of Armenian Gulls *Larus armenicus* were observed. Total winter count was 442, and the species was present until early April. It was found to be relatively common along the Mediterranean coast east of the Damietta branch of the Nile, and in marine habitats of the three lagoons along this coast. Small numbers were seen along the Suez Canal and the Red Sea coast. No Armenian Gulls were found in any of the inland waters. Other large gulls counted in winter included Yellow-legged Gulls *L. cachinnans* (2340), Lesser Black-backed Gulls *L. fuscus* (120; including the first Egyptian record of *L. f. heuglini*), and Great Black-headed Gulls *L. ichthyaetus* (35).

Introduction

The Armenian Gull *Larus armenicus* is known from a restricted breeding area in high altitude lakes of Armenia (Lake Sevan, Lake Arpa), Iran (Lake Uromiyeh), eastern Turkey (Van Gölü), and at least one locality (Tuz Gölü) in Central Anatolia in Turkey (Suter 1990). The size of the breeding population is unknown, but likely to be rather small. Outside the breeding season the occurrence of Armenian Gulls is well documented on the Mediterranean coast of Israel (Géroudet 1982, Hume 1983, Dubois 1985, Grant 1987, Satat and Laird 1992). There are also reports from the Persian Gulf (Bourne 1988) and from Oman along the coast of the Arabian Sea (Bundy 1986).

Until recently there was no evidence for the occurrence of Armenian Gulls in Egypt (Goodman and Meininger 1989). However, the recent reports of considerable numbers along the Mediterranean coast of Israel suggested the occurrence in Egypt to be expected. The first reports of Armenian Gulls from Egypt were by Bourne (1988), who found it to be 'the main form' of 'Herring Gull' seen along the Suez Canal in February 1988, and by Everett (1988), who reported at least ten adult birds in the Great Bitter Lake on 11 March 1988. Hoogendoorn (1991) observed three adults near Hurghada on 22 January 1989 and two adults at Abu Rudeis on 7 February 1989. It was not until an extensive survey of Egyptian wetlands in 1989/90, that a more clear picture of the occurrence of the Armenian Gull in Egypt was obtained. Bearing in mind identification pitfalls, observations made during this project revealed the presence of considerable numbers of Armenian Gulls in Egypt. This paper summarizes the observations of Armenian Gulls in Egypt in 1989/90. In addition some information is presented on the winter distribution of other large gull species. The systematic position of the Armenian Gull is one aspect of the highly debated 'Herring Gull'-complex (e.g. Glutz von Blotzheim and Bauer 1982, Cramp and Simmons 1983, Suter 1990). This subject is beyond the scope of this paper, where for the sake of simplicity we treat the form as a full species.

Methods

Between December 1989 and late May 1990, an extensive ornithological project was carried out in Egypt, including a mid-winter survey of most wetlands, and an intensive wader catching and counting programme in spring, focusing on Lake Manzala and Suez Bay. In December 1989 and January 1990 all major wetlands in lower Egypt were covered by a combination of aerial surveys and counts from boats and from the shore. In addition selected parts of the Red Sea coast, the Nile River and Lake Nasser were visited.

Identification

Most birds positively identified as Armenian Gulls were adults. Only a few first and second winter birds

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were seen. Identification was generally based on the 'jizz' in combination with plumage characteristics. Compared to the Yellow-legged Gull *L. cachinnans,* the Armenian Gull is smaller and has a more rounded head with a relatively shorter bill; this, combined with slight differences in proportions, iris colour and bill pattern (see below) give the bird an appearance recalling a Common Gull *L. canus* more than a Yellow-legged Gull. Plumage characteristics of adult birds include more black in the wing tips, the back being a trifle darker, a dark iris, and a distinctive bill pattern: orange- yellow with a blackish subterminal band. The single first winter bird observed was identified by a combination of size and proportions (compared with adult birds in the same flock). Calls from eight adult Armenian Gulls on 9 January were noted as recalling those of Common Gull. Confusion of Armenian Gull with Russian Common Gull *L.c. heinei* may occur, particularly because of the larger size of the latter compared to the nominate *L.c. canus.* Satat and Laird (1992) presented more details about the identification of the Armenian Gull.

Winter distribution of Armenian Gull

In winter a total of at least 442 Armenian Gulls was observed (15% of all larger gulls identified), making this species the most numerous large gull in Egypt after the Yellow-legged Gull. Armenian Gulls were mainly found scattered along the Mediterranean coast east of the Damietta branch of the Nile and on the saline parts of the adjacent coastal lagoons Lake Manzala, El Malaha and Lake Bardawil. Moreover, 22 were observed along the Great Bitter Lake and the southern part of the Suez Canal and a single bird along the Red Sea coast near Hurghada. The Mediterranean coast west of the Damietta branch was surveyed only very incompletely, and the extent to which Armenian Gulls occur in this area needs further study. No Armenian Gulls were found at the two small areas visited along this part of the Egyptian coast (outlet of Lake Burullus and harbour of Alexandria). Furthermore, no Armenian Gulls were found on any of the coastal lakes in the central and western part of the Nile Delta, or in any of the inland waters visited.

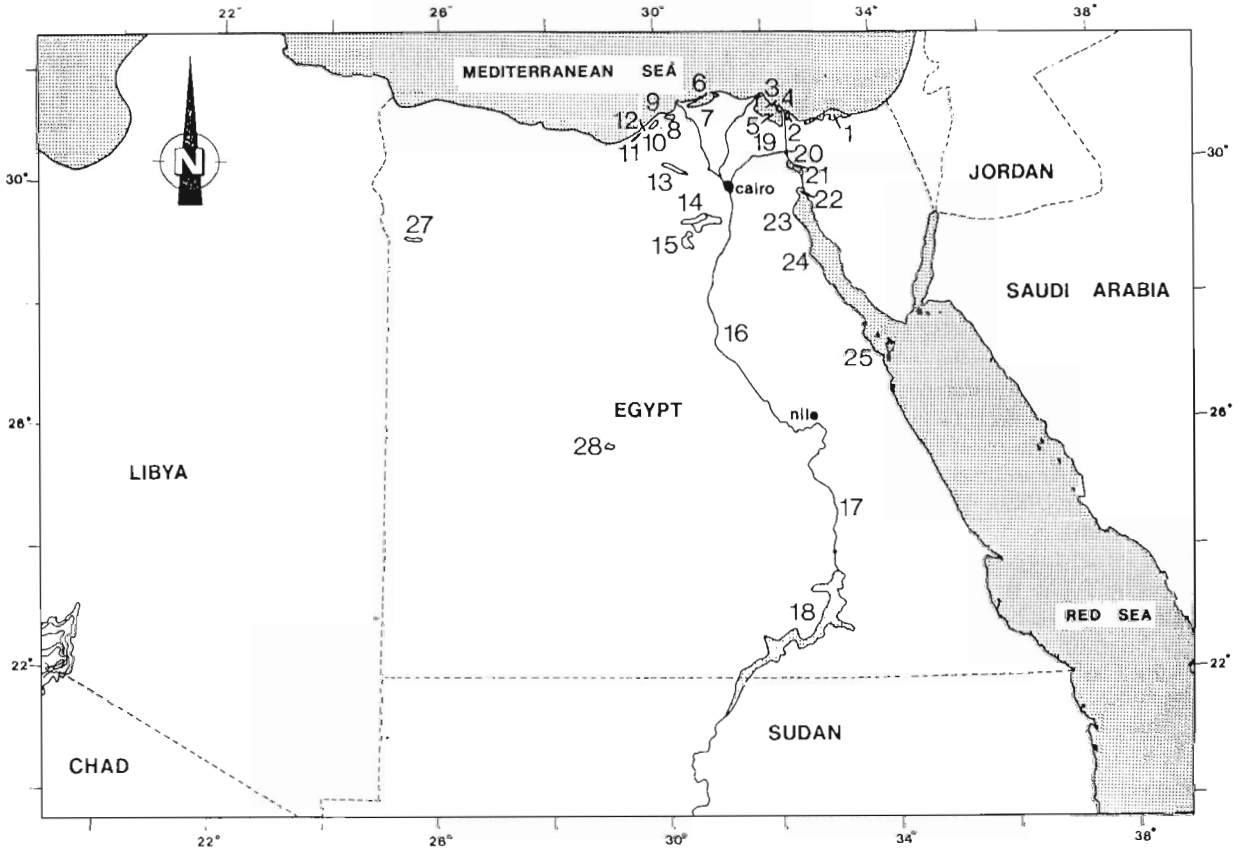

Figure 1. Geographical position of localities mentioned in Table 1.

Most Armenian Gulls were found in small flocks, up to c. 20 birds. An exceptionally large concentration of 253 individuals was seen in the northern, saline, part of Lake Manzala on 7 January. Most of these birds were resting on the lake, but several were observed hunting in flight for insects over a reed-bed together with Black-headed Gulls *L. ridibundus*. This behaviour was never noted in Yellow-legged Gulls.

In winter, seven flocks of 1-14 birds (40 birds in total) along the Mediterranean coast of Lake Manzala included 37 adult, two second winter and one first winter birds The sample is too small to draw general conclusions on the age-classes involved. In addition to this sample, 22 adults were noted in a flock of large gulls near Suez on 2 January and one adult near Hurghada on 10 January.

Spring distribution of the Armenian Gull

During the spring 1990 survey, Armenian Gulls were still present until early April. In the eastern part of Lake Manzala, which was counted weekly between early March and late May, there were several observations: six adults on 5 March, 45 on 11 March, 36 on 19 March, 64 on 25 March, and four on 3 April. Other spring records include one adult at Abu Sultan on 11 March, and single adult birds at Suez on 12 March, 20 March and 3 April. Apart from the few birds at Suez (see Meininger 1992), no other migratory movements were noted in Egypt in spring 1990.

Winter distribution of large gulls in Egypt

In total, 3551 large gulls were recorded during the 1989/90 winter survey, of which 83 % were identified

Table 1. Large gulls observed in Egypt in winter 1989/90 per area.
cach. = *Larus cachinnans*, arme. = *Larus armenicus*, fusc. = *L. fuscus*, icht. = *L. ichthyaetus*, spec. = unidentified large gull. See figure 1 for position of localities.

Area	habitat	cach.	arme.	fusc.	icht.	spec.
1. Lake Bardawil	marine	58	14	11	4	315
2. El Malaha	marine	9	47	4	-	-
3. Lake Manzala, beach	marine	165	70	6	1	-
4. Lake Manzala, lake north	salt-brackish	293	284	1	-	166
5. Lake Manzala, lake south	brackish-fresh	982	4	-	-	50
6. Lake Burullus, beach	marine	116	-	2	1	-
7. Lake Burullus, lake	brackish-fresh	47	-	-	1	-
8. Lake Idku	brackish-fresh	314	-	33	-	-
9. Alexandria harbour	marine	50	-	21	-	-
10. Lake Maryut	brackish-fresh	89	-	-	-	-
11. Lake Maryut, depression	saline	-	-	-	-	-
12. Lakes near Burg el Arab	brackish-fresh	-	-	-	-	-
13. Wadi el Natrun	saline	-	-	-	-	-
14. Lake Qarun	saline	7	-	8	9	-
15. Wadi el Rayan	brackish	-	-	-	19	-
16. Nile Valley, north	fresh	-	-	-	-	-
17. Nile Valley, south	fresh	-	-	2	-	-
18. Lake Nasser	fresh	-	-	1	-	-
19. Sarqiya lakes	fresh	-	-	2	-	-
20. Lake Timsah	marine	2	-	1	-	3
21. Bitter Lakes	marine	96	22	1	-	60
22. Suez Bay	marine	42	-	22	-	20
23. Red Sea, Suez-Ain Sukhna	marine	50	-	-	-	-
24. Red Sea, Ain Sukhna-Zafarana	marine	4	-	-	-	-
25. Red Sea, Hurghada	marine	16	1	4	-	-
26. Nile Delta, various	fresh	-	-	1	-	-
27. Siwa Oasis	saline	-	-	-	-	-
28. Dakhla Oasis	fresh	-	-	-	-	-
total:		2340	442	120	35	614

to species (Table 1). Most numerous was the Yellow-legged Gull (2340 individuals, 80 %), which was the dominant species along the Mediterranean coast and in the Nile Delta lakes, but scarce in inland saline lakes and absent from freshwater habitats in the Nile Valley. The Armenian Gull (422, 15 %) was the second-most numerous large gull. It was found almost exclusively along the coasts, most numerous along the Mediterranean Sea, where it made up 25 % of the large gulls. Lesser Black-backed Gulls *Larus fuscus* (120, 4%) were present in small numbers in almost all wetlands visited, including freshwater habitats. One adult Lesser Black-backed Gull at Alexandria harbour on 18 January showed characters of *L.f. heuglini* (large, robustly built, pale yellow legs, bold blotching on the neck). This is the first indication of the occurrence of this subspecies in Egypt (Goodman and Meininger 1989). A total of 35 Great Black-headed Gulls *L. ichthyaetus* was seen: on 5 January one first winter at the northern part of Lake Manzala (10 km west of Port Said), on 12 January four at Lake Bardawil, on 14 January one adult at Lake Burullus, on 16 January one adult along the Mediterranean coast of Lake Burullus west of El Burg, on 21/23 January seven adults and two second winter birds on Lake Qarun, and on 22 January 19 in Wadi el Rayan. The mid-winter total of 35 Great Black-headed Gulls is the highest for about 70 years, as a flock of 50 was reported from Lake Qarun on 20 January 1920 (Meinertzhagen 1930, Goodman and Meininger 1989).

Discussion

Current knowledge on the Armenian Gull in Egypt suggests that it is probably a relatively common winter visitor, which is widely distributed along the Mediterranean coast, at least east of the Damietta branch of the Nile, and in smaller numbers along the Suez Canal and along the Red Sea coast. Occurrence along the Egyptian Mediterranean coast is a continuation of the occurrence along the Mediterranean coast of Israel. Occurrence of the Armenian Gull in Egypt is probably not a new phenomenon, but has simply been overlooked hitherto due to a lack of knowledge of field identification. Data on the winter distribution in Egypt indicate a difference in habitat preference compared with the other three large gull species. The Armenian Gull was almost exclusively recorded in or close to marine habitats along the coast. In Israel it is also mainly found in marine habitats, including coastal fish farms, along the Mediterranean coast. The almost strictly coastal occurrence of Armenian Gull in both Egypt and Israel could indicate that the species is perhaps more pelagic in its ecology than the other large gulls in the region.

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Avocetta N° 16-2: 93-94 (1992)

The nesting by the Herring Gull *(Larus argentatus)* in the Towns and Villages of Bulgaria

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Introduction

In the past the Herring Gull *Larus argentatus* in Bulgaria only bred on the rocks and along coast of the Black Sea. More than 100 years ago a part of the bird began nesting on the roofs of the houses in the coastal towns and villages. During the period 1890-1893, Reiser (1894) found them breeding in the cities near the sea. We suppose that in Europe this phenomenon first occured in Bulgaria. The explanation must be probably sought in the lack of safe places for breeding, in the increased density of the population and the negative human role in the coastal area colonies.

Material and Methods

The information for this report was collected during the period 1972-1992, and also via questionnaires sent (1979, 1981 and 1992) to the employees of the Bulgarian Ornithological Centre, hunters and biology teachers, to whom I am most grateful.

Results and Discussion

The safe nesting upon the roofs of the houses, the availability of food on the town rubbish dumps, in combination with the increasing pollution of the

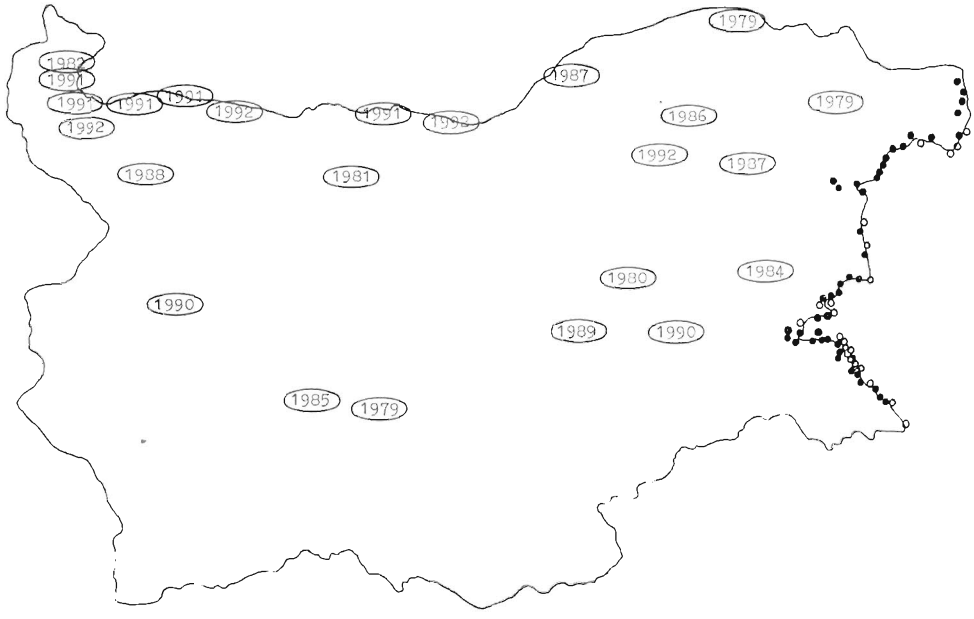

Fig. 1 - Herring Gull resting in the towns and village in Bulgaria.
○ nesting on rocks and along the Black Sea
● nesting on houses in the towns and villages near the Black Sea
1979 year of settlement in the towns and villages in the interior of the country

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Black Sea and the depletion of its fish population, led to the synanthropization of the Herring Gull in Bulgaria. After 1975 the species began to moving west-wards and populating the towns and villages in the interior of the country (Figure 1). Since 1979 the Herring Gull has no longer nested in the cities of Tolbuchin, Silistra and Plovdiv, since 1980, it has stopped nesting in Silver, and since 1981, in Pleven. Then there were about 4000 breeding pairs of Herring Gulls in Bulgaria, of which 2500 pairs bred on the roofs of the houses in the towns and villages near the sea, and the largest rock colony (772 pairs) was on the island of St. Ivan near the town of Sozopol (Nankinov 1981). Over the last decade Herring Gulls have bred in the following towns and villages: since 1982 - Vidin; 1984 - Aitos; 1985 - Pazardzik; 1986 - Razgrad; 1987 - Schumen, Ruse; 1988 - Michailovgrad; 1989 - Stara Zagora; 1990 - Yambol, Sofia; 1991 - Dunavci, Artchar, Lom, Kozlodui, Nikopol; 1992 - Popovo, Oriachovo, Svischtov (and probably in the village of Drenovez, in the district of Vidin - pers. com. D. Yordanov). In 1992 the breeding population of the Herring Gull in Bulgaria was 4274 pairs, of which 4081 pairs (95.5%) nested near the sea, and 193 pairs (4.5%) on the houses in towns and villages in the interior of the country. Most Herring Gulls (2705 pairs - 63.3%) bred on the house roofs. 1969 pairs bred on rocks, i.e. 36.7% of the Bulgarian population of the species. All of the pairs breeding on rocks were on the Black Sea coast; P. Yankov and K. Niagolov, 1987 write that in 1984 one pair nested on rocks near Studen kladenez Reservoir in the Eastern Rhodopi mountains. The largest colony on St. Ivan island - 880 pairs.

We suppose that in the future the Herring Gull wil continue to populate the towns and villages in the interior of Bulgaria, especially near the rivers Danube, Mariza (Evros), Tundza, Iskar etc., and that its population in the interior will increase rapidly.

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Status and migration of the Slender-billed Gull *(Larus genei)* in Bulgaria

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Abstract — The earliest Slender-billed Gulls arrive in Bulgaria after July 5. Some 72.7% migrate to the Mediterranean in August-October. A tiny number, 1.0 to 2.2% of the birds spend the winter and spring in Bulgaria. The Black Sea is the spring flight route. Nesting by the Slender-billed Gull may be expected in Lake Atanassovsko.

Introduction

It is known that the Slender-billed Gull *(Larus genei)* is a Sarmatian species which occurs unevenly; the major nesting sites are along the northern Black Sea, around the Caspian Sea, the Persian Gulf and in Central Asia. Over the past three decades the area has expanded westwards and nesting has been observed at the Mediterranean wintering sites and on the African coasts (Isenmann 1976, Cramp and Simmons 1983).

Although many authors report on the Slender-billed Gull, it continues to be a bird that has not been studied enough in Bulgaria. In the 1950s (Patev 1950) it was not counted as a member of the Bulgarian fauna. The bird was "rediscovered" (Prostov 1955, Boev 1957) although scientists had previously encountered it along the Bulgarian Black Sea (Skorpil 1892) and even watched it nest regularly there and in Dobroudja (Alleon 1886, Boetticher 1927, Petrov 1950).

Material and Methods

Information about the Slender-billed Gull was collected by fieldwork in the territory of Bulgaria and in all seasons, and by a review of the literature records about 43 ringed birds are kept in the Bulgarian Ornithology Centre (Prostov 1955 and 1964, Boev 1957, Semenov and Sabinevski 1957, Paspaleva 1962, Paspaleva-Antonova 1961 and 1965, Paspaleva and Dontschev 1970, Dontschev 1976, Roberts 1980 and 1981, Nankinov 1982 and 1985 and others). The scientific information thus collected was used to clarify in which regions of the country the bird occurs, the dynamics of numbers throughout the year, and the migration periods and migratory routes.

Results and Discussion

Processing of the fieldwork results established that a total of 14,727 Slender-billed Gulls have been recorded at 33 points in Bulgaria (Figure 1-A). Of these 90.7% occured at Lake Atanassovsko where the species forms concentrations exceeding 1000. At Lake Pomorie there are concentrations of several hundred birds (7.5%). The remaining 31 points host just 1.8% of the Slender-billed Gulls in Bulgaria. The results of ringing the birds provide an approximately similar picture of the distribution of the species in Bulgaria. Slender-billed Gulls ringed in the Ukraine migrate to different Bulgarian regions but it is the Black Sea coast and the Upper Thracian Plain where they occur in greatest numbers. Lakes Atanassovsko and Pomorie, where 32.6 and 27.9% of the ringed birds have been found, and the banks of the river Maritsa, around Pazardjik - 16.3% (Figure 1-B), are of primary importance. These three locations are the habitat of 76.8% of the Slender-billed Gulls. The remaining 23.3% are scattered around the country's water-bodies.

The Slender-Billed Gull is a permanent resident in Bulgaria. After July 5 numerical growth and appearance of flocks along the southern coast are observed (Figure 2). Young Slender-Billed Gulls leave the nest island along the northern Black Sea in early July (Semenov and Sabinevski 1957, Siokhin *et al.* 1988). The first young birds therefore reach Bulgaria some five days after leaving the nest islands. The July encounters constitute 10.8% of the total annual number of these birds in Bulgaria. August (28.2%), September (24.2%) and October (20.2%) are the months of migration in greatest numbers when most of the population of this species (72.7%) flies across the Black Sea coast on its way to the wintering site. The last migrants make for the

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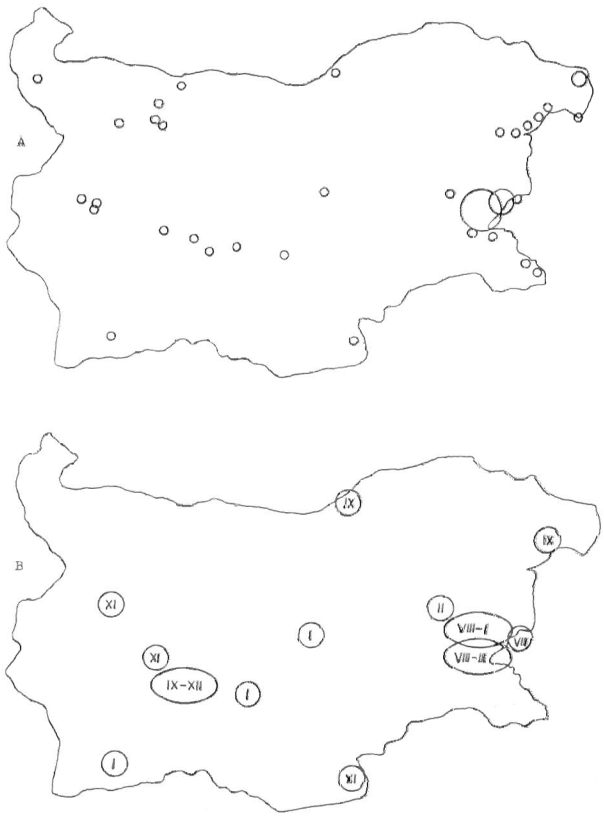

Fig. 1 - The location of the Slender-billed Gull in Bulgaria.
A - Concentrations observed:

. -1-100 birds; ○ over 500 birds;

○ over 100 birds; ◯ over 1000 birds;

B - Birds, ringed in the Chernomorski Reserve in the Ukraine from 16.VI. to 4.VII., and found in Bulgaria between 1.VIII. and 27.III.

Mediterranean in November. After that the numbers of Slender-billed Gull in Bulgaria do not fluctuate markedly. From 1.0 to 2.2% of the birds stay in the country over the winter. In spring their percentage is 1.1 - 1.8 and in June 0.5. These percentages suggest that the birds that remain in Bulgaria after November are the same (young birds and birds that have not reached sexual maturity) and wander from one Bulgarian water-body to another till summer. It is noteworthy that a number of the birds with rings that are found in Bulgaria have been ringed together in the Chernomorski Zapovednik and during the first months they stick together, usually at Lakes Atanassovsko an Pomorie. This confirmes (Semenov and Sabinevski 1957, Siokhin et al. 1988) that the Slender-billed Gull flocks are homogeneous in terms of age. Later (after September) some birds left the flocks and migrated from the coastal biotopes westwards to the Upper Thracian Plain. Mass migrations and numerical increase are not observed in the Slender-billed Gull in Bulgaria in spring. The small groups observed after mid-winter and spring are some of the birds that winter in the country, and when they reach sexual maturity they will probably move to the Black Sea coast and from there, to their first nesting sites. The Slender-billed Gulls that return from the Mediterranean do not cross Bulgaria and arrive from the direction of the Black Sea. Few flights have been observed over the coast in spring. In summer and spring the Slender-billed Gull therefore migrates from the nesting site to the Mediterranean via the southern Black Sea coast. The stray birds that reach inland water-bodies in Bulgaria do not migrate further, and winter there. They do not go more than 500-600 km from the sea, as in neighbouring Serbia the species is very rare (Matvejev and Vasic 1973). The ringed Slender-billed Gulls so far found in Bulgaria all come from the Chernomorski Zapovednik in the Ukraine (Figure 1-B).

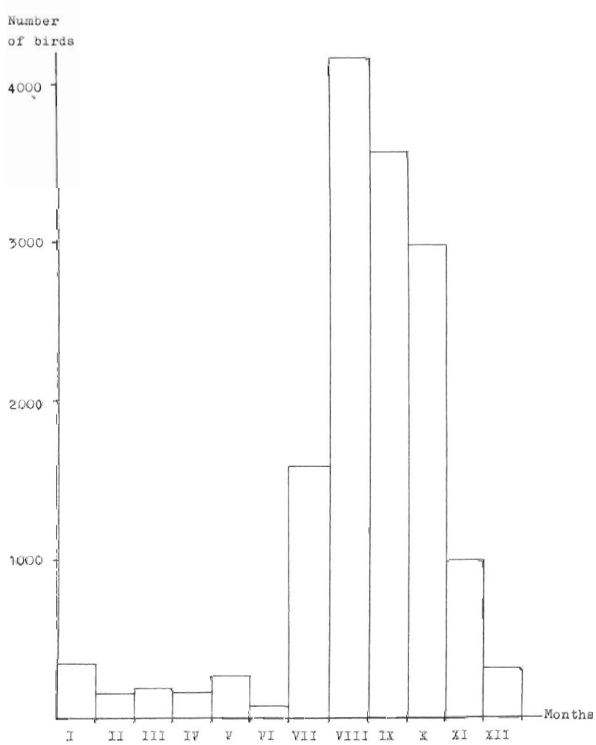

Fig. 2 - Season distribution of the Slender-billed Gull *(Larus genei)* in Bulgaria.

They were ringed between June 16 and July 4 and resided in Bulgaria between August 1 and March 27. They reached the Bulgarian shores a month and three days after they were ringed. However, as has

already been said, the young birds that left the nests first may arrive in Bulgaria much earlier. Conclusions can be drawn from the ringed birds about the age of the Slender-billed Gulls in Bulgaria. 14.6% of the birds are two months old, 17.1% - three months, 61% overall - up to six months old, 19.5% - from six months to one year, 7.3% - two years, 9.8% - three years and 2.4% - five years. The oldest Slender-billed Gull found in Bulgaria was 4 years 7 months and 16 days old. These birds can live as long as 23 years and 4 months (Rydzewski 1978). Swamps, lakes, river mouths, sea bays, dams and fish nurseries that have shallow patches and are rich in food are the habitats of the Slender-billed Gull in Bulgaria. In winter the Gull visits out of-town garbage pits. The hyperhaline Lakes Atanassovsko and Pomorie, which are rich in food (mainly *Artemia salina),* are regular summer habitats of the species. However nests with eggs and broods have not yet been found. The reason may be sought in a number of negative factors, mainly predators: stray dogs and cats, foxes, jackals, wild boars, and regular human presence during the nesting period which discourage the birds from nesting. Nonetheless, we have reason to suppose that the Slender-billed Gull will breed again in the lakes and swamps along the Bulgarian Black Sea coast. We think that the nesting area expansion which started a few decades ago in the Mediterranean is the return of the species to previous nesting regions used in the late 19th and early 20th century (Wallace 1964). Over the next few years it may be expected that the Gull will breed at Lake Atanassovsko and one of the arguments is that the Mediterranean Black-headed Gull (*Larus malanocephalus*) is already breeding there (200 pairs at the most in 1984), as is the Sandwich Tern (*Sterna sandvicensis*, 2 pairs in 1981, 280 nests in 1992). It is known (Zubakin 1988) that the Mediterranean Black-headed Gull and the Slender-billed Gull follow the Sandwich Tern in the expansion of its nesting area and settle in the biotopes where it broods and form mixed colonies with it. The Slender-billed Gull is a listed bird in Bulgaria; it is included in the country's Red Book. Lake Atanassovsko, the major habitat of the Slender-billed Gull, is a reserve.

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The colony of the Audouin's Gull at the Ebro Delta

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Abstract — We describe the Audouin's Gull colony established in the Ebro Delta (NE Spain) since 1981. The amazing growth of this colony, which is now the largest in the world, with about the 60% of the species' world population, was favoured in our view both by the complete protection of the breeding areas from human interference since 1987, and by its high reproductive success (maximum 2.01 chicks/pair in 1988). This breeding success is the highest recorded in Audouin's Gull colonies studied to date, and it seems to be due to the high availability of feeding resources (demersal fish) from activities by the local fishing fleet. Moreover, disturbance by breeding Yellow-legged Gulls was low. Changes in these factors could break the colony stability, as happened with the moratorium on inshore fishing in 1991 and 1992. The fragility of the Audouin's Gull population is mainly due to its generalized low breeding success in the main colonies, and its concentration in a few large colonies.

Introduction

Although its colonies are quite widespread throughout the Mediterranean (Figure 1), most of the Audouin's Gull *(Larus audouinii)* population is concentrated in the Western Mediterranean (Bradley 1988, Troya *et al.* 1989). It seems that both availability and abundance of its main food resource, the clupeid fish, are much higher in the Western than in the Eastern zone (Witt *et al.* 1981) and this factor might limit the increase of the Eastern colonies.

Until the establishment of the colony at the Ebro Delta, Audouin's Gull was unique among gulls in being limited for breeding to a particular kind of habitat, rocky islands (Cramp and Simmons 1983). However, at the Ebro Delta the species for the first time occupied a totally different habitat on the mainland coast. The habitat is a peninsula of 2500 ha. with a mosaic of salt marsh and psammophilous communities and a flat profile with small dunes (Càmarasa *et al.* 1977).

The growth of the Audouin's Gull colony in the Ebro Delta

The Ebro Delta colony was established within the Punta de la Banya peninsula (Ebro Delta Natural Park) in 1981, after an increase in the records of Audouin's Gulls during post-breeding periods in 1979 and 1980, especially immature and sub-adult birds (Martinez and Motis 1982). Since then, the colony has grown constantly to become the biggest in the world, reaching ca. 7000 pairs in the 1992 breeding season (Figure 2). This number represents

Figure 1. Distribution of Audouin's Gull colonies, and percentage of nests in relation to total world population in the three main colonies in 1991 (estimated world population 9.000 pairs).

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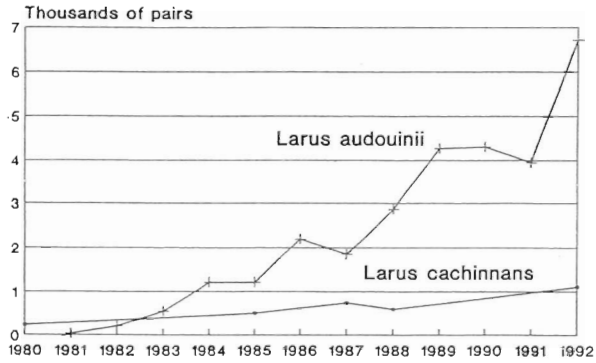

Figure 2. Growth of Audouin's Gull and Yellow-legged Gull population in the Ebro Delta.

approximately 60% of the species' world population.

Colony growth may have been favoured by the complete protection of breeding areas from human interference since 1987, which has guaranteed peace at the colony site.

Interactions with Yellow-legged Gulls

One of our aims was to check the pressure exerted by the Yellow-legged Gull *(Larus cachinnans)* on the Audouin's Gull at the Ebro Delta colony. Culling is practised in the Balearic and Chafarinas Islands to control the Yellow-legged Gull population, and the negative consequences of its presence on Audouin's Gull have been discussed in other colonies Sardinia (Monbailliu and Torre 1986), the Columbretes Islands (Catala *et al.* 1990). However, only the studies carried out in the Chafarinas Islands demonstrated the real damage caused by Yellow-legged Gulls, with quantitative data on aggression, predation and dominance, especially on eggs and chicks (Bradley 1988).

Nonetheless, at the Ebro Delta colony where Yellow-legged Gulls have bred for several decades, it is surprising that its population has remained fluctuating but stable until the 1992 breeding season, in which it increased in number (See Figure 2). It is a vast colony with scattered nests, occupying the most favourable sites on dunes, thus avoiding the risks of floods, which are very frequent in the area because of the strong winds in March and April. We have no evidence for the existence of habitat competition between Audouin's and Yellow-legged Gulls, though it is probably not high because of the large surface area of suitable habitat in the peninsula.

Moreover, only some pairs of Yellow-legged Gull breed in the middle of the Audouin's Gull colonies, and the interactions are minimal, as demonstrated by data gathered on samples of animals joining or leaving the colony.

Behavioural observations were carried out during 21 days between the beginning of April and the end of June 1992 in a subcolony of 160 pairs, either by watching the colony, or by watching the gulls arriving at the colony. The observations began at day break and continued until after sunset watching the colony from an observation point far off 150 metres. We recorded the number of Audouin's Gulls arriving at the colony and the interspecific relationship observed with Yellow-legged Gull, divided into three categories: Kleptoparasitic, predation upon adult Audouin's and predation upon Audouin's nests; results are shown in Table 1.

Table 1. Predatory interactions by Yellow-legged Gulls on Audouin's Gulls.

	Kleptoparasitic interactions	Predation of adult Audouin's Gulls	Predation of Audouin's Gull nests (160 breeding pairs sub-colony)
No. of hours observation	563	563	563
No. of attacks	186	10	8
No. of attacks/1000 birds	2.58	—	—
Success (%)	35.9	70	20

Kleptoparasitic activities were regularly observed, especially at early and late hours of the day, when Audouin's Gulls come back from their feeding places. The predation on adult Audouin's Gulls is scarcer and also occurs at the same hours, when most of Audouin's Gulls move to and from the colony. These attacks probably begin with a kleptoparasitic fight, but if the number of the Yellow-legged Gulls involved is high and Audouin's Gulls do not regurgitate their prey, the attacks can turn into a direct predation if the Audouin's Gulls are unable to escape. Flocking during attacks confers Yellow-legged Gulls a high success rate, from 35 to 70 %, although the number of attacks per hour or per 1000 Audouin's Gulls censused is very low.

In contrast, the attacks performed in the Audouin's Gull colonies are made by single Yellow-legged Gulls, and their success rate drops to 25%, because these attempts are carried out after landing and this may favour the Audouin's Gull's defense behaviour.

At the Ebro Delta colony the impact of Yellow-legged Gulls upon Audouin's Gulls is low. Further studies are needed, for example of habitat or food availability in order to evaluate this impact more precisely.

Breeding success

Breeding success was calculated as the number of fledglings per breeding pair. Breeding pairs were estimated by counting the total number of adult gulls in the colony during the second half of May, one or two weeks before main hatching period, and the figures obtained were corrected by counting the total number of nests in control areas. During 1992, 1988 and before 1983 full nest counts were made. Total number of fledglings were estimated by mark-recapture methods at the end of June or in the first days of July, just when the young birds begin to fledge; Chapmann closed populations three-sample experiment in 1988, and Paterson closed populations two-sample experiment in 1991 and 1992 (Telleria 1986).

One of the factors that could have contributed to the amazing growth of the Ebro Delta colony is the exploitation of the feeding resources made available by the fishing activities of the local fleet. This benefit could explain the high breeding success registered at the Ebro Delta colony in the early years, whilst a voluntary moratorium on inshore fishing in the waters of the zone during the key months of May and June 1991 caused reproductive success to decrease greatly (Table 2). In 1991 Audouin's Gulls collected many prey from the paddy fields and adults regularly foraged far from the colony (Paterson *et al.* 1992); this supports the view that the usual prey were in short supply.

Table 2. Audouin's Gull breeding success at the most important colonies (Ebro Delta and Chafarinas). Data from Bradley (1988), Troya *et al.* (1989), Paterson *et al.* (1991), G. Alvarez (pers. comm.) and our study.

Place	Breeding success	Year
Ebro Delta	2.01	1988
Ebro Delta	0.84	1991
Ebro Delta	0.92	1992
Chafarinas Is.	0.31-0.44	1983
Chafarinas Is.	0.24-0.26	1984
Chafarinas Is.	≤0.15	1985
Chafarinas Is.	0.36	1987
Chafarinas Is.	0.57	1988
Chafarinas Is.	≈0.01	1989
Chafarinas Is.	0.42	1990
Chafarinas Is.	0.35-0.41	1991

It is important to note that the breeding success recorded in 1988 at the Ebro Delta colony was much higher than any other registered in any other colony. In the Chafarinas Islands, from which the best set of comparative data comes, breeding success has always been very low (G.Alvarez, pers. comm.). Audouin's Gulls probably follow a conservative strategy and the adults, which have a long life expectancy, do not invest much energy in raising a high number of chicks in sub-optimum environmental conditions.

Current situation

One of the main problems for the species is the concentration of almost 80% of the total world population in two colonies in the Western Mediterranean: the Chafarinas Islands and the Ebro Delta, while 8.5% is in the Balearic Islands (Figure 1).

In 1988 a high mean clutch size combined with high breeding success resulted in a high productivity of the Ebro Delta breeding colony which may be estimated to have produced about 74% (ca. 6000 chicks) of the fledglings at Spanish colonies. Thus any incident affecting the stability of ths colony site could endanger the future of the species, although for the moment the situation at the Ebro Delta seems steady.

Table 3. Audouin's Gull clutch size at the Ebro Delta (data from this study).

Clutch size	Sample (n)	Year
2.74	252	1988
2.40	30	1991
2.14	1269	1992

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Pesticide residues in Cory's Shearwater eggs *(Calonectris d. diomedea)*

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Abstract — Deserted eggs of Cory's Shearwater from a colony off Crete were analyzed for chlorinated hydrocarbon content. Substantial concentrations of DDE and PCBs were found. High concentrations of DDE are correlated with those of PCBs. Almost at the top of the Mediterranean food chain, Cory's Shearwater is a good bioindicator for the Mediterranean.

Introduction

Pollution of the Mediterranean is a question of special concern, because it is quite cut off from the oceans and human waste of any sort can accumulate more rapidly here than out in the open seas. In order to monitor the state of the Mediterranean, pelagic species should be studied whose distribution covers not only the whole Mediterranean, but reaches way out into the Atlantic so as to establish a basis for comparison. Cory's Shearwater *(Calonectris diomedea)* is certainly suitable for such bio-monitoring because it is widely distributed and almost at the top of the food chain. The Atlantic subspecies *borealis* breeds off Madeira and on the Canary and Selvagem Islands, while the Mediterranean subspecies *diomedea* breeds in colonies on small rocky islands from the Columbretes off Spain or the Chafarinas off Morocco in the west to the Greek and Turkish islands in the east. The wintering area of Cory's Shearwaters is in the southern Atlantic where they stay from November to February and where the environmental burden should be low in comparison to that of the Mediterranean. In March they re-enter the Mediterranean through the Strait of Gibraltar and proceed to their breeding island or its vicinity immediately. Here they spend two months before the pair produces a single egg (weight 70-85 g) at the end of May. Females are at least 5 years old before they lay their first egg and may well reach an age of more than 20 years. Their food consists of small fish, fish spawn, cephalopods and crustaceans. They search the surface of the sea in pursuit of their food over an area probably greater than 100 km x 100 km. They typically stay more than 1 km off the coast, so that they do not visit lagoons, river mouths, or marshes, and are never seen at garbage dumps inland (Cramp and Simmons 1979, Wink *et al.* 1982, Zammit and Borg 1986). We undertook a study of chlorinated hydrocarbons in Cory's Shearwater eggs.

Material and Methods

We studied a population of Cory's Shearwater on a small island off Crete for more than 15 years; we now know more than 300 nest sites in crevices which are accessible to an investigator, and we checked them for abandoned eggs in June 1990, '91 and '92. Eggs with a punctured shell were collected. These accidents may perhaps happen when both adults are moving in the crevice and the egg hits a stone. Apparently abandoned cold eggs with undamaged shells were left in place because in the past we found some cases where an egg was left alone for a complete day, but a chick hatched later on in July. ('Egg chilling' is a common phenomenon among the Procellariiformes (Warham 1990)). Only if such eggs were unattended for 3 consecutive days were they considered as truly abandoned. The samples (Table 1) were obtained in two weeks of field work per season. From our 15 years of experience with the island, we can say that quite a few of these eggs stem from irregularly occupied, untypical nests, so we suggest that the sample may be biased towards young birds.

Egg contents were later analyzed in the laboratory for pesticide residues by capillary gas chromatography according to standard procedures as described in Hädrich *et al.* (1992). Concentrations were calculated on the basis of the egg's dry weight.

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Table 1 - Residue concentrations of chlorinated hydrocarbons in 20 eggs of Cory's Shearwater from Crete (in mg/kg dry weight).

year	nest no.	HCB	Lindan	cis HCE	pp-DDE	PCB 138	PCB 153	PCB 180	PCB total*
1990	786 E	0.035	n.d.	0.026	9.16	1,714	2.934	2.057	24.75
1991	634	0.013	n.d.	n.d.	2.99	0.57	1.02	0.69	8.4
"	—	0.015	n.d.	n.d.	9.46	0.69	1.20	0.75	9.7
"	616	n.d.	n.d.	n.d.	5.37	0.67	1.29	0.92	10.7
"	743	0.019	n.d.	n.d.	5.02	0.86	1.37	1.03	12.1
"	976	0.011	n.d.	n.d.	4.46	0.70	1.61	1.13	12.9
"	740	0.013	n.d.	n.d.	16.23	1.22	2.28	1.19	17.0
"	D11	0.013	n.d.	n.d.	26.32	2.28	3.62	2.74	32.0
"	—	0.02	n.d.	n.d.	22.83	3.77	8.49	6.54	70.9
1992	646	n.d.	n.d.	n.d.	1.48	0.28	0.62	0.52	5.4
"	827	n.d.	n.d.	n.d.	2.40	0.39	0.61	0.55	5.9
"	721 NE	n.d.	n.d.	n.d.	2.53	0.30	0.83	0.64	6.8
"	616	n.d.	n.d.	n.d.	1.85	0.47	0.90	0.65	7.5
"	976	n.d.	n.d.	n.d.	4.01	0.70	1.20	0.77	9.8
"	681	n.d.	n.d.	n.d.	4.08	0.67	1.11	0.98	10.4
"	650 W	n.d.	n.d.	n.d.	3.27	0.59	1.30	0.92	10.5
"	674	n.d.	n.d.	n.d.	2.68	0.63	1.37	1.07	11.6
"	698	n.d.	n.d.	n.d.	2.51	0.48	1.26	1.39	12.3
"	817 B	n.d.	n.d.	n.d.	5.85	0.80	1.59	1.25	13.7
"	740	n.d.	n.d.	n.d.	6.34	0.84	1.95	1.65	16.9

Table 2 - Residue concentrations of chlorinated hydrocarbons in eggs of three bird species from the same island (in mg/kg dry weight)

	HCB	Lindan	cis-HCE	pp-DDE	PCB 138	PCB 153	PCB 180	PCB total*	Reference
Cory's Shearwater (Mean, n = 18)				4.98	0.70	1.36	1.01	11.5	Table 1
Yellow-leggend Gull (n = 1)				12.11	1.00	1.44	0.81	11.7	Hädrich pers. comm
Eleonora's Falcon (Mean, n = 14)	0.007	0.001	0.023	5.28	0.04	0.14	0.09	1.0	Wink *et al* 1991

* PCB total calculated as Arochlor 60, in order to allow comparison with data in former publications.

Results

A single deserted egg was analyzed for a first test in 1990. As this egg showed a high level of PCB, more detaidel investigations were carried out in 1991 and 1992 (Table 1). While Lindan and cis-HCE could not be detected, the concentration of PCB was relatively high (mean = 11.5 ± 4.5 mg/Kg, n = 18). The two eggs from 1991 with the highest concentrations are not included in the calculation of the average for reasons of pattern coherency. The level of DDE, a derivative of DDT, was also substantial (mean = 4.98 ± 3.5 mg/kg,, n = 18). The data suggest that high levels of DDE are correlated with high levels of PCB.

Discussion

The presence of PCB indicates industrial contamination, whereas DDE residues point to agricultural activities. These organochlorine compounds are easily distributed in the environment and enter the sea through sewage or rivers or can directly derive from sea vessels (in the case of PCBs) or can stem from the atmosphere, Since PCBs and

DDE accumulate in the food chain, they are regularly found in all kinds off shorebirds in varying amounts. But the high level found in Cory's Shearwater off Crete is a reason for special concern, particularly since the mountainous island of Crete has little industry and not much farm land. Thus the data should reflect the pollution of the Mediterranean in general. For further comparison, data from the same island for the Yellow-legged Gull (*Larus cachinnans)* and Eleonara's Falcon (*Falco eleonorae)* are given in Table 2. In the Falcon eggs the contamination levels are lowe than those for the gull and especially the PCB levels are lower than those for the two sea species. Since the falcons feed on passerine birds and insects it seems that these terrestrial species have been spared most of the PCB burden. We therefore assume that not only Cory's Shearwaters and Yellow-legged Gulls but probably all Mediterranean sea and shorebirds are critically affected (Bourne *et al.* 1980).

Three nests contained failed eggs with similar pesticide concentrations in consecutive years (no. 616, 976. 740 in Table 1). We assume that because these nests were quite exposed to daylight the same relatively young and inexperienced female was involved each year. We have no direct evidence for pesticide related breeding failures, hatching success being 84% and fledging success 82%. The organochlorine data of 2 eggs collected off Crete in 1983 (Renzoni *et al.*, 1986) fit well with the data of Table 1. The highest concentrations found in our study are comparable to data from Majorca. When all available Mediterranean data are considered, PCB levels are 2 to 25 times higher than those from the Atlantic (Renzoni *et al.* 1986). Although no pesticide related breeding failures of Cory's Shearwater occurred, the high levels of PCB and DDE are a reason for concern about the environmental condition of the Mediterranean.

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Does Cory's Shearwater breed every year or is there evidence for a sabbatical?

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Abstract — A colony of Cory's Shearwater *(Calonectris d. diomedea)* was studied for several years on a rocky island off Crete. Care was taken to distinguish breeding birds, including unsuccessful breeders, from the non-breeding population. From yearly retrap data of breeding birds it is concluded that they make a breeding attempt every year and do not take a sabbatical. This result differs from the finding that the Atlantic subspecies *borealis* shows a sabbatical frequency of 7% (Mougin *et al.* 1985).

Introduction

Large southern hemisphere albatross species such as the Wandering Albatross *Diomedea exulans* have unusually long breeding periods. The time period from egg laying till fledging of the young lasts from January to December. When the time for the occupation of nest territories and pair formation before the breeding season, and for moult afterwards are included, this period is even longer. It is plausible that birds of this size do not breed continuously but only every other year. The year in between is termed a 'sabbatical' year. All larger albatrosses regularly take a sabbatical year, so that the sabbatical frequency within the population is 100% (Warham 1990). In the medium-sized Procellariiformes some of the population breed a number of years in sequence, but then are probably exhausted and take a year off. Thus a fraction of the population is regularly out for a sabbatical year (Warham 1990). Although Cory's Shearwater *Calonectris d. diomedea* is the largest representative of the Procellariiformes in the Mediterranean, it is a small to medium-sized bird (weight 400-800 g) in comparison to the albatrosses. A substantial fraction of the population can reach an age of 20 years. A report on the Atlantic subspecies *borealis* described a sabbatical frequency of 7% (Mougin *et al.* 1985). We tried to find out whether a sabbatical year is also a regular phenomenon in the Mediterranean subspecies of Cory's Shearwater.

Material and Methods

The population of 500-800 pairs studied lives off Crete on a rocky island less than 1 km in length. We spent a few weeks on the island every season for more than 15 years. Cory's Shearwater nests were located by day by looking for places with faeces and investigating the nearby crevices with a strong torch. As nests can easily be overlooked, we also searched for nests in August/September during the night when the feeding call of the chick gives evidence for nest position. Nests were marked by an inconspicuous, small black metal badge with a nest number which even in a sea-side atmosphere lasts for more than 20 years. We therefore now know more than 320 accessible nest sites.

Nests are typically 2-3 m deep in the rock, in holes and crevices, almost always one nest per entrance. We know only 8 nests under dense vegetation. This is in contrast to the situation on the Selvagem Islands where a substantial part of the population studied bred in the open (Jouanin *et al.* 1989). Distances between nests can be as small as 2 m, are typically 20 m, and in exceptional cases can be more than 50 m. Shearwaters show a high degree of nest site tenacity, but occasionally an adult shearwater breeds in the neighbouring nest site in the following year (Ristow *et al.* 1991).

The study area of 350 m x 250 m contained 207 accessible nests, 119 unaccessible nests and the number of unknown nests is estimated at about 30.

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Table 1. Retrap data for breeding Cory's Shearwaters in a test area with an estimated number of 350 nests.

year	investigated nest sites	occupied nests	adults on the egg		"new" breeders		potential sabbatical	
			♂	♀	♂	♀	♂	♀
1985	111	96	87	80	-	-		
1989	179	137	122	121	90	87		
1990	176	152	132	136	37	40	1	0
1991	204	164	143	148	45	43	0	1
1992	207	162	127	142	38	27	0	1

Nests were checked during the daytime in June when shearwaters incubate their eggs. In addition to ringing the birds, we marked the incubating adult with a small white paint dot on the forehead. The paint lasts for 3-4 weeks before peeling off. So that when checking the nest again a couple of days later, the white marked bird did not need to be disturbed again. After a typical incubation spell of 6-7 days, the partner usually took over breeding duties, and was recognized by the absence of a dot and checked for ringing. Owing to the difficult topography of the island, about 40 nests could be checked per day, and after two weeks of field work the breeding population of the study area was almost completely evaluated. As hatching success is only 84% and deserted eggs may be eaten by rats, care was taken not to confuse early egg loss with non-breeding. The field work reported here was carried out in 1985 and 1989-92.

Results

In monitoring the breeding shearwaters in our study plot we tried to find out whether the birds breed every year or whether some of them take a sabbatical. An overview of our results is given in Table 1. The number of breeding birds checked is lower than the number of occupied nests because of breeding failures early in the season or because we did not succeed in capturing all the adults. The term "new" breeders refers to birds which had not been trapped before or were recorded before as known non-breeders (bachelors). In 1989 the number was high because we did not check the birds in June 1986-88, i.e. some birds died and others moved in. As a rule, we checked all breeding birds in the other years. When they were missing we did not see any of the breeding birds again in any of the subsequent years. We assume that these birds had died, so the column "new breeders" indicates the yearly population exchange.

In comparison to this data, the number of birds which might qualify for a sabbatical since they were retrapped after an intermittent year is very low (Table 1, last column). Here we list those birds whose nest was either empty the previous year or where another bird of the appropriate sex was present in the nest in the previous year and the former owner could not be found elsewhere. We do not include in this category birds where egg shells indicated an early breeding failure, or where the adults could not be trapped, but were again breeders in the following year. As shearwaters do not produce a substitute clutch, the subsequent months of non-breeding are a natural reaction to breeding failure, but do not fulfill the biological meaning of a sabbatical. Even if we accept the individuals in the last column of Table 1 as sabbaticals, a frequency always less than 1% is found. Error introduced by dispersal of ringed breeders to unchecked nests in one year and back to an accessible nest the next year would increase the apparent sabbatical frequency. Hence, 1% is an upper limit. It seems more reasonable, however, to assume that also in these few cases an undetermined natural cause of breeding failure had occurred and escaped our knowledge. We suggest therefore that the sabbatical effect does not exist in the Aegean population of Cory's Shearwater.

Discussion

When unsuccessful breeding starts are excluded, there remains no firm evidence for a sabbatical year for the Mediterranean subspecies of Cory's Shearwater. An apparent sabbatical can be the result of egg loss or of partner loss, at an advanced phase in the breeding cycle. In particular, we have no case when a pair was off on sabbatical. Among large albatrosses a pair always goes on sabbatical. A year later it is advantageous for the pair to meet again, so that pair formation and territory occupation are simplified. In species with a low value of sabbatical frequency and a large reserve population, the nest site of a pair on sabbatical is occupied in the meantime by competitors who breed in the intermittent year and claim their rights when the former owner returns. This disadvantage of the sabbatical hardly exists for the albatrosses, but is immanent for Cory's Shearwater.

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The Dnestr Delta, Black Sea: ornithological importance, conservation problems and management proposals

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Abstract — The Dnestr Delta is one of the most intact wetland ecosystems in the Black Sea. In a total area of 220 km², dominated by extensive reedbeds, important populations of waterbirds nest in colonies, some of them in numbers of international significance. The seasonal floods of the river are the key factor for the functioning of this wetland ecosystem, but human intervention and the construction of a hydroelectrical dam are now having serious environmental impact on the delta. A management plan for the waters of the river should be fully implemented and the delta should be designated as a National Park in order to halt and reverse its degradation.

Introduction

The Dnestr Delta is situated on the NW coast of the Black Sea, in the Ukraine (46x27'N-30x10'E), 30 km SW of Odessa city. It covers an area of 220 km² of natural habitats. The dominant vegetation consists of extensive reedbeds *Phragmites australis*, whereas along the river and on high ground there are large zones of willows *Salix cinerea* scattered among the reedbeds. Within the delta, there are 25 small and 4 larger freshwater lakes covering a total area of 8 km².

The Dnestr flows into the sea through a narrow freshwater lagoon of 408 km² and 1-1.5 m deep. The river, one of the largest in the Black Sea region, has an average water discharge of 322 m³/sec, but when in flood it can reach peaks of 500-1500 m³/sec. The river floods regularly from 3 to 11 times/year. The extent of flooding in the delta depends on the width of the floodplain, which varies between 3 km in the upper part of the delta to 13 km near the sea: the broader the floodplain the less extensive the flood is. During these floods the water in the floodplain can reach 1-2 m deep.

This regular, natural flooding is the key factor to the functioning of the whole delta ecosystem, upon which a very rich and diverse flora and fauna, particularly birds, depend.

This paper presents, in a summary form, the ornithological importance of the Dnestr Delta and its conservation problems, providing also some guidelines and proposals for its ecological management. The author draws heavily on his 18 year experience in monitoring the bird populations of the delta and has attempted to assess the impact of recent human activities on this important wetland ecosystem by using them as bio-indicators (Diamond and Filion 1987).

Results and Discussion

67 bird species have so far been recorded as breeding in the Dnestr Delta (data from 1972 to 1991) (Table 1). For some of these species, particularly from the last two categories, the Dnestr Delta hosts breeding populations of international or regional importance: so far, 11 species qualify for such criteria (Grimmett and Jonew 1989) and at least one, the Glossy Ibis *Plegadis falcinellus*, a species declining over all its Palearctic range, still nests in large numbers (200-1450 pairs) (Table 1). The delta also hosts large concentrations of migrating waterfowl and waders, but it is much less used by birds in winter, because it usually freezes over. Due to its ornithological importance, the Dnestr Delta has already been classified as an Important Bird Area (no: 054) (Grimmett and Jones 1989), though it still lacks any legal protection.

Although the Dnestr Delta still offers optimum habitats for nesting waterbirds, the seasonal floods, particularly during the breeding season, are a serious limiting factor, adversely affecting overall breeding success. The birds have, of course, developed various strategies of nest site selection in order to cope with the floods. It is however, beyond the scope of the present paper to attempt an analysis of these strategies (Schogolev in prep.). What can be very

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briefly mentioned here is that, depending on the species, nests are built on the higher parts of trees or bushes, among the drier parts of the reedbeds, on rafts of floating vegetation or simply float. Nevertheless, when the floods are intense and the water level rises more than 1.5 m, heavy losses of nests, eggs or chicks occur.

The geographical location of the colonies of Ciconiiformes and the Mute Swan *Cygnus olor* nests are shown in Figure 1.

The history of human intervention in the Dnestr Delta can be divided into three periods.

The first period starts at the beginning of the century up to 1950. In this period human impact on the delta was very slight to negligible.

The second period is from 1954-1982, when large areas of marsh (150 km^2) in the delta were drained for agriculture, particularly in Moldavia. As well as agricultural developments since 1976, fishery installations were also constructed in the delta, destroying large zones of natural habitats in an area of more than 15 km^2. Finally, at the end of the 1970s, two large roads constructed across the centre of the delta, destroyed the hydrological balance over much of the area, by blocking some of the secondary branches of the river and thus preventing the natural floods from inundating an average of 40 km^2 in the lower part of the delta. In this period, pollution problems started to appear.

In 1970-1972 the port of Belgorod-Dnestrovskii was reconstructed. Excavation works and the deepening of the freshwater lagoon destroyed its hydrological balance. Now more sea water enters the delta (particularly in dry seasons) and this has a great impact particularly on water invertebrates like crayfish etc. During the same period, a great increase in erosion problems also took place. It is estimated that many thousands of tons of soil silted up many lakes and channels. Siltation at the bottom of these lakes has reached 0.6- 1.8 m, resulting in water circulation problems in much of the delta. Finally many more people were now using the delta, resulting in overfishing, overhunting, poaching etc.

In the third period (1983-1992) the major environmental problems of the delta are related to the construction and operation of a large hydroelectric plant (700,000 kW power), nearly 700 km upstream along the river. The artificial lake of this plant now covers a surface of 150 km^2 with a water volume of 3.3 km^3. The construction and operation of this plant had a very serious impact on the delta ecosystem, particularly in 1986-1987.

This ecological crisis was due to a strong reduction in the natural discharge of the river from an average

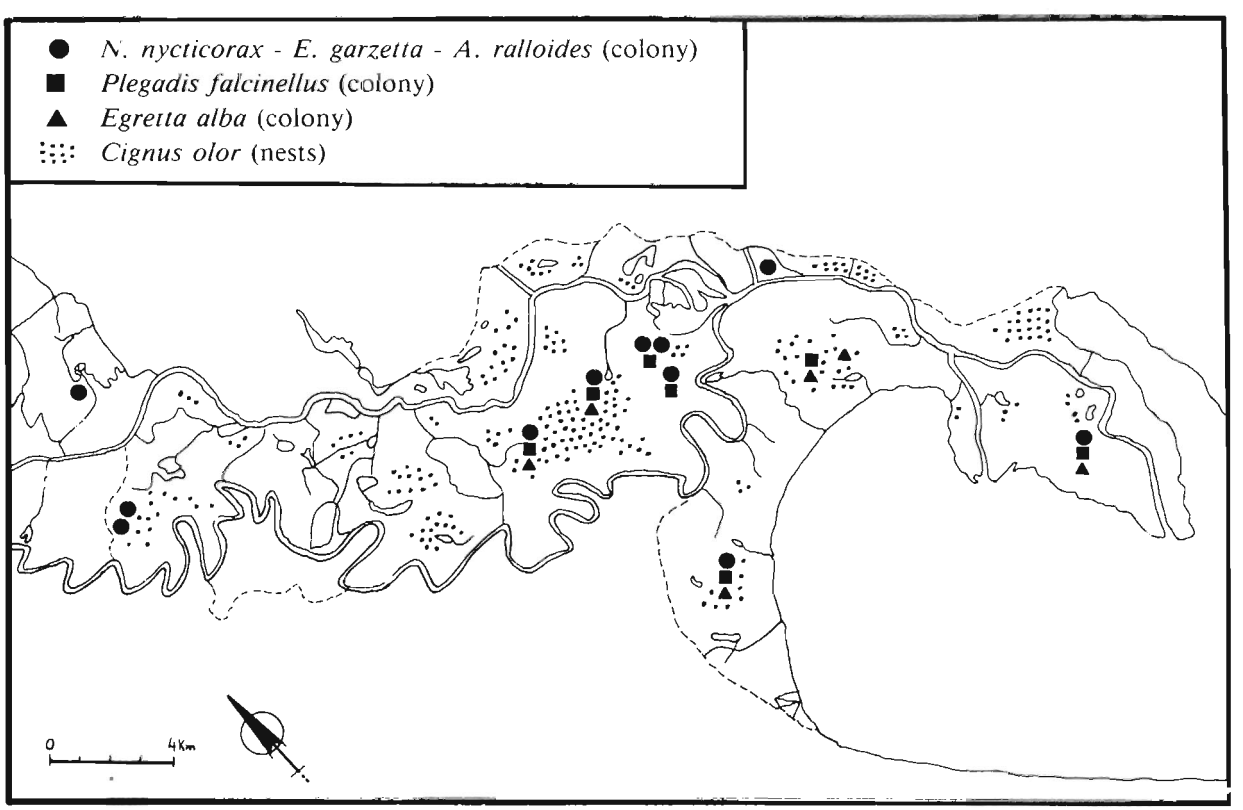

Figure 1: Dnestr Delta. Distribution of large wader colonies and Mute Swan nests.

of 300 m^3/sec to 160-200 m^3/sec. Moreover this reduced volume of discharge was now artificially controlled and kept at the same level for more than 16 months. In this 16 month period, no natural flooding occurred because of the filling up of the reservoir. As a first result of the reduced flow, phenomena of algal blooms appeared for the first time in the freshwater lakes of the delta and also in the lagoon in front of the river mouth. Then the dried up marshes started to burned by local, over an area of 50 km^2. The overall ecological disaster became much worse in the spring and summer of 1987, after 14 months of drought, when the first indicators of terrestrial vegetation appeared. Populations of fish and amphibians crashed and mass deaths of freshwater bivalves e.g *Anodonta cygnea,* insects and water insects e.g. *Emphemera velgata, Dytiscus* spp., *Cybister* spp. etc. occurred.

Inevitably, the populations of nesting waterbirds were also very adversely affected. As shown in Table 2, some species, mainly insectivorous ones e.g. Glossy Ibis, Squacco Heron, or waterfowl e.g. Mute Swan, did not nest at all in 1987 or with only very few pairs, compared with previous breeding seasons.

This critical situation gradually started to improve, particularly during the first months of 1988, when natural floods were now allowed to inundate the delta. The populations of nesting waterbirds started to recover and by 1989 the ecological balance in the delta, at least as indicated by the bird populations (Table 2), was re-established.

Conclusions and proposals for conservation

Through the ages, the Dnestr Delta has evolved to become a stabilised, but at the same time dynamic wetland ecosystem. The proper functioning of the ecosystem is totally dependent on the hydrology of the river and particularly on its seasonal floods. Despite the 16 month "artificial" drought during the 1986/87 crisis, the whole ecosystem quickly recovered when the floods started again. However with the construction of the hydroelectric plant, the waters of the Dnestr are now controlled by man and the ecological crisis of 1986/1987 proved that man has very little respect for the delta ecosystem, and is interested only in energy production. It was only after strong protests and pressure from local conservationists that the electricity company authorities were persuaded to manage the river in such a way that more water was allowed to flood the delta. This water management programme started in 1988 and it was due to this programme that the delta regained most of its former importance. During the year, two "artificial" ecological floods (in spring and summer) are released, carrying about 1.5 km^3 of

Table 1. Number of breeding pairs in the Dnestr Delta (1979-1991). FB denotes former breeding species.

Species	No. of breeding pairs	
Podiceps cristatus	80-150	
Podiceps grisegena	40-100	
Podiceps nigricollis	3-22	
Phalacrocorax carbo	100-2300	
Phalacrocorax pygmaeus	2-30	
Botaurus stellaris	3-6	
Ixobrychus minutus	20-30	
Nycticorax nycticorax	1500-2500	
Ardeola ralloides	400-600	
Egretta garzetta	200-400	
Egretta alba	250-350	
Ardea cinerea	100-200	
Ardea purpurea	100-150	
Ciconia ciconia	15-20	
Plegadis falcinellus	200-1450	
Platalea leucorodia	4-12	
Cygnus olor	10-320	
Anser anser	100-140	
Anas platyrhynchos	60-90	
Anas querquedula	2-6	
Aythya ferina	5-10	
Aythya nyroca	2-4	
Milvus migrans	3-10	
Haliaeetus albicilla	0-1	(FB)
Circus aeruginosus	3-5	
Buteo buteo	1	
Falco tinnunculus	1	
Falco subbuteo	2-4	
Falco cherrug	0-1	(FB)
Rallus aquaticus	15-25	
Gallinula chloropus	80-150	
Fulica atra	250-450	
Himantopus himantopus	1	
Vanellus vanellus	1-3	
Larus ridibundus	40-250	
Sterna hirundo	300-600	
Chlidonias hybridus	160-460	
Chlidonias niger	4-15	
Columba palumbus	3-8	
Streptopelia turtur	3-6	
Cuculus canorus	8-15	
Bubo bubo	0-1	(FB)
Asio otus	5-20	
Alcedo atthis	5-8	
Riparia riparia	30	
Hirundo rustica	15-30	
Motacilla alba	2-4	
Luscinia luscinia	3-8	
Phoenicurus phoenicurus	2-3	
Locustella luscinioides	100-150	
Acrocephalus schoenobaenus	90-120	
Acrocephalus agricola	80-120	
Acrocephalus scirpaceus	250-350	
Acrocephalus arundinaceus	80-150	
Sylvia borin	6-10	
Panurus biarmicus	150-300	
Parus caeruleus	10-20	
Remiz pendulinus	5-15	
Oriolus oriolus	1	
Pica pica	6-10	
Corvus frugilegus	30	
Corvus corone	400-500	
Corvus corax	1	
Sturnus vulgaris	15-20	
Passer montanus	15	
Fringilla coelebs	5-10	

Table 2. Impact of the hydroelectric plant on the populations of waterbirds nesting in the Dnestr Delta. Numbers show the proportion (percentages) of nests in relation to the 1975-1982 average.

Species	1986	1987	1988
INSECTIVOROUS			
Ardeola ralloides	34	4.4	30
Plegadis falcinellus	100	0	22
INSECTI- PISCIVOROUS			
Nycticorax nycticorax	100	35	68
Egretta garzetta	100	28	54
PISCIVOROUS			
Phalacrocorax carbo	100	100	100
Egretta alba	75	33	73
Ardea cinerea	100	100	100
WATERFOWL			
Cygnus olor	35	3.4	100
Anser anser	33	25	28
Fulica atra	46	10	51

water to the delta in a period of about 50 days. The optimum period for these two floods is from 20 April-20 May and then from 20 June-20 July. The flow of the river in these peak periods should be regulated at 500-800 m^3/sec.

There are, however, many more things to be done in order to improve the situation. Overfishing, overhunting, pollution etc. should be properly controlled and delta land uses should be carefully planned and defined. Infrastructure work is also necessary to restore some of the more degraded habitats, e.g. the opening of new channels to improve water circulation, levelling off of unwanted dykes, control of erosion phenomena etc.

Most of all, however, the time has now come to designate the Dnestr Delta as a National Park (350 km^2), with a core area of 80 km^2 as a strict reserve, which includes the most important bird colonies and much of the area of the delta natural habitats. Together with local scientists we have already submitted a full proposal for this, based mostly on ornithological data. Unfortunately, the Ukrainian Ministry of the Environment has not yet accepted this, claiming that fishermen and hunters are opposing such a proposal. We strongly believe that this is the only way to manage the delta as a valuable ecosystem, to safeguard the important breeding populations of so many declining species and to stop and reverse the loss and degradation of one of the most important coastal wetlands in the Black Sea-Mediterranean region.

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The Lagoon of Venice: a premigratory crossroads for Little Terns *Sterna albifrons*

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Regular mist-netting carried out during spring tides at a night roost in the Venice Lagoon, Italy (45.11÷45.35 N, 12.07÷12.38 E) has led to important catches of Little Terns, *Sterna albifrons:* 1,748 birds have been ringed in three years (1990-1992). Checks on ringed birds have allowed the detection of pre-migratory movements of a population much larger than the local one, probably covering all the North Adriatic breeding sites.The roost was located on an inshore tidal sand-bar ("Bacan"), near the Lido lagoon-mouth, 3 km to the east of Venice. Little Terns came to the area in small flocks (20-200 birds), from just before sunset till after dusk. The birds gathered in one dense flock on the shoreline, often together with migrant Black Terns, *Chlidonias niger,* and steadily moved as the tide came in.

Observations of thousands of birds were made in summer 1990 and 1991, while regular counts were only attempted in 1992: <100 birds during May and June, >3000 during July and on 12/8/92, >5000 on 26/8/92, >1500 on 9/9/92. These figures are only minimum estimates because of the extremely poor conditions of light during the surveys. However according to the available literature, no roosts of similar size seem to be known in Europe (Cramp 1985, Glutz and Bauer 1982).

Little Terns were caugnt between 12 May and 25 September. Data was pooled into 7-day periods numbered from the beginning of year. Considerable captures took place every year starting from period 28 (9/7 - 15/7), just at the end of the breeding season. In the same week the first juveniles were caught, although with a low percentage (av. 8,4%). The value increased over the following weeks, reaching maximum (av. 33.9%) in period 36 (3/9 - 9/9).

The mean body mass of Little Terns slightly differed among the three study years, both for adults and juveniles. Juveniles were significantly lighter than adults in each year. Every year mean body masses of both age classes were nearly constant until period 32 (6/8 - 12/8): they varied between 49.1 g and 50.7 g in adults and between 47.7 g and 48.2 g in juveniles. A small increase (adults: 51.9 g; juveniles: 49.7 g) was recorded in period 34 (20/8 - 26/8) while in period 36 (3/9 -9/9), a few days before the departure of most Little Terns towards winter quarters, the mean body mass increase was definitely more marked (adults: 57.6 g; juveniles: 56.2 g). Body mass variation of birds trapped more than once in the same season reflected the trend of the means.

Direct recoveries were obtained for 87 Little Terns ringed as chicks at the following sites: 76 in the Po Delta, 3 slightly upstream along the same river (Ficarolo-Ravalle), 6 in the Comacchio wetland complex, 1 in the southern Venice Lagoon, 1 in the Marano-Grado Lagoon (Table 1). The percentages of retraps compared to the number of chicks ringed in the Po Delta, along the Po river and in the Venice Lagoon are higher than the percentages from Comacchio and Marano-Grado. Recoveries of birds ringed in previous years also refer to other natal colonies (e.g. Cervia salt-pans, Po river near Pavia) and to stopover sites along the coast of Tuscany visited by migrating adults.

Table 1. Details of direct recoveries of Little Terns at Bacan, Venice Lagoon. Pooled data from the whole study period (1990-1992).

Natal site	Distance from Bacan (km)	Direction from Bacan (degrees)	Ringed chicks	Direct recoveries	%
Ficarolo	93	234	89	3	3.36
S. Venice Lagoon	25	209	36	1	2.78
Po Delta	60	177	3580	76	2.12
Comacchio	93	191	731	6	0.82
Marano	81	72	222	1	0.45
Cervia	133	182	151	0	0.00

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Eradication of the Brown Rat from the Toro Islets (Corsica): remarks about an unwanted colonizer

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Abstract — Between 1986 and 1988 the Brown Rat *(Rattus rattus)* was introduced onto the Toro Islets, an important place for breeding birds (Cory's Shearwater *Calonectris diomedea,* Storm Petrel *Hydrobates pelagicus,* Pallid Swift *Apus pallidus,* and other birds). The aims of this paper are: (i) to describe and discuss the method used to eliminate the rats from these islets in 1991-1992, (ii) to show the consequences of the Brown Rat's introduction on seabirds on Corsican islets. Keeping islands free from rats appears to be a major target for the conservation of seabirds in the Mediterranean.

Introduction

The Brown Rat *Rattus rattus* is known on 34 of the 125 vegetation-covered islets off Corsica (Guyot 1989, Guyot *et al.* 1992). On the Toro islets it was previously absent, at least in 1979 (Papacotsia and Soreau 1980) and 1986 (Delaugerre and Brunstein 1987), but in July 1989 rats were located on Toro Grande and Toro Piccolo (Bretagnolle and Thibault 1990). Arriving between 1986 and 1988, they were either introduced by man or they landed from a boat anchored near the islets. In 1989 their number was estimated at several tens. In 1990 a first attempt at eradication carried out from the 1st to the 9th of July, succeeded in catching 79 individuals and their density was estimated at 50 individuals per hectare (Granjon et al. 1992).

On account of the originality and great fragility of the Toro islets' flora and fauna (Lanza 1972, Papacotsia and Soreau 1980, Lanza and Poggesi 1986 and Table 1) it was decided to eradicate the rats from them. The aims of this paper are to describe the method used and to show the consequences of the presence of the Brown Rat on the composition of the fauna of flying vertebrates breeding on the islets off Corsica.

Study area and Methods

The eradication of Brown Rats was carried on on the Toros (9°23'E, 41°30'N), a group of 5 islets covering 2.6 hectares, situated in the Cerbicale Archipelago, south-east of Corsica (Figure 1). We followed Lanza and Poggesi (1986) for the toponymy. Toro Grande is separated from the mainland by 6.3 km and from the nearest islet of the archipelago by 3.9 km. Its maximum height is 34 meters. Table 2 presents some characteristics of the Cerbicale Islands. Due to its small surface area, the absence of fresh water and a limited vegetation cover, they have never been exploited by man for agriculture or pasture. As the property of the National Navy, the Toro islets have never been incorporated in the Cerbicale Natural Reserve, despite their great biological interest.

We used PVC tubes sited on the islets for the rat eradication. Each contained a solid poison bait (Coumatetralyl), held in the center by wire. The tubes were placed on December 10th 1991, and were checked during 5 visits; baits were replaced if they had been gnawed.

Results and Discussion

Tables 3 and 4 show the number of poison stations left on the islets and the percentage of baits gnawed on each visit. On the last visit, none of the baits had been gnawed and during visits in May 1992 no rat was seen at night.

Why exterminate the rat on the Toro islets?

Two species of rats *(Rattus rattus* and *R. norvegicus)* may occupy European islands. The Brown Rat inhabits numerous islands and islets in the Mediterranean (Cheylan 1984). Its diet is mainly vegetarian (Cheylan 1988), but its predation on birds has been largely underestimated. On the Toro islets, two kinds of disturbance have been noticed: (i) high

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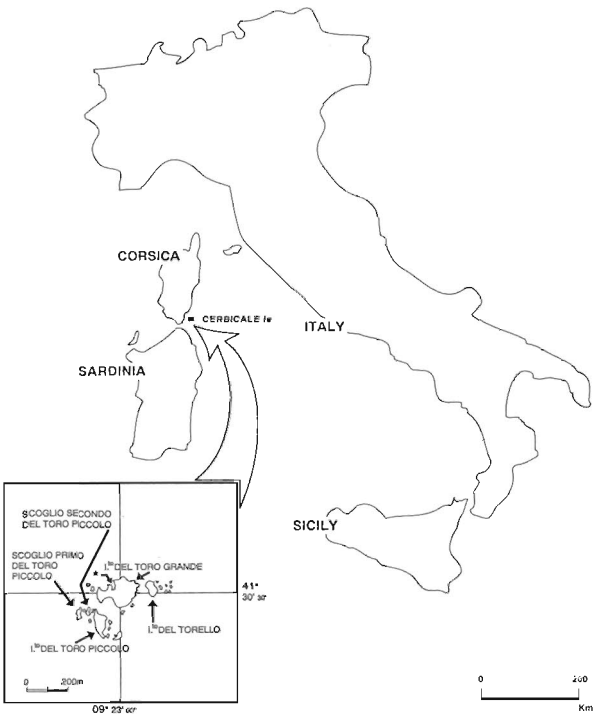

Figure 1 - The Cerbicale Islands (From Lanza and Poggesi 1986)

predation of Cory's Shearwater *Calonectris diomedea* chicks since 1988, (ii) over-grazing, especially on Toro Piccolo whose vegetation was nearly destroyed in 1991. For example, a rare plant *(Silene velutina* Pourret) which was recorded on a small number of islets (Lanza *et al.* 1983) was relatively abundant in 1988 (i.e. some tens), but in 1989 only 8 could be found on Toro Grande and none on Toro Piccolo.

A study of petrel predation by rats suggested that the birds are endangered when their weight is equal or inferior to that of rats (Imber 1975, Moors and Atkinson 1984). The mean weight of rats on Toro was 187.8g ($\pm$23.6, n = 16) for males and 164.3g ($\pm$12.9, n = 13) for females (Granjon *et al.* 1992). We may thus conclude that the rat constitutes a threat to several vertebrates on the islets, such as the Storm Petrel *Hydrobates pelagicus,* the Pallid Swift *Apus pallidus* and the European Free-tailed Bat *Tadarida teniotis,* Table 5.

Examination of the flying vertebrates list for the 125 islets off Corsica (Guyot 1989, Guyot *et al.* 1992) shows the influence of the presence of the rat (Table 5). We may notice that:

(i) the Storm Petrel and the European Free-tailed bat are significantly absent when the Brown Rat is present; Hydrobatidae are very sensitive to

Table 1 - Information on Cerbicale islands, (1) Guyot 1989, (2) Gamisans 1992, (3) after Cheylan 1988.

Islet	Presence of Brown Rat	Surface area (1) (ha)	Distance from coast (m)	Distance from rat dispersal source (m)	Number of vascular plants (2)	Number of plants eaten by brown rat (3)
Vacca	No	0.48	3.215	1.000	6	4
Forana	Yes	15.48	1.780	1.780	76	10
Maestro maria	Yes	3.2	1.600	1.600	68	12
Piana	Yes	18.49	1.600	1.600	71	7
Pietricaggiosa	Yes	4.58	2.125	2.125	46	6
Toro	No	2.6	6.300	3.9	10	4

Reference: (1) Guyot 1989, (2) Gamisans 1992, (3) after Cheylan 1988.

Table 2 - Number of flying vertebrates on Toro.

Species	Number	Reference
Hydrobates pelagicus	20-30 pairs	Bretagnolle and Thibault (1990)
Calonectris diomedea	39-55 pairs	Linard, Linard and Thibault, unpub. (1988)
Larus cachinnans	90-110 pairs in 1986, but probably increasing recently	Guyot (1987)
Larus audouinii	no breeding after 1980	Delaugerre and Thibault, in prep.
Apus pallidus	<250 pairs	Brunstein, unpub. (1986)
Tadarida teniotis	5-10 individuals	Bretagnolle and Thibault, unpub. (1989)

Table 3 - Percentage of baits gnawed et each visit.

Date	% of baits gnawed (n = 150)
16 Dec. 1991 (installation)	0
31 Dec. 1991	72
14 Jan. 1992	34
09 Feb. 1992	7.3
25 Feb. 1992	2.6
28 Apr. 1992	0

Table 4 - Number of poison stations on the Toro Islets

Locality	Number of tubes
Toro Grande	100
Toro Piccolo	42
Torello	5
Scoglio secondo del Toro Piccolo	8
Scoglio primo del Toro Piccolo	4

rats because of predation on chicks and the disturbance of adults (Moors and Atkinson 1984),

(ii) Cory's Shearwater, the Pallid Swift and the Rock Pigeon *Columba livia* are present with a significantly higher density where the Brown Rat is absent,

(iii) there is no such relation for the Shag *Phalacrocorax aristotelis*, Audouin's Gull *Larus audouinii*, the Yellow-legged Gull *Larus cachinnans* and the Alpine Swift *Apus melba*; we may notice that (i) the period of emancipation of the chick after hatching is longer for Shags and gulls than for Storm Petrels and Cory's Shearwaters and (ii) that the Alpine Swift nests in crags which are of difficult access for rats.

Method used

Trapping with two-door boxes was carried out in 1990; the catch rate remained high after six consecutive nights (Granjon *et al.* 1992). This method proved inefficient and logistically heavy. The use of a rodenticide appears easier and more efficient (Moors *et al.* 1989), as shown by previous experience on another Mediterranean island (Daycard and Thibault 1990). Although no experiment on the resistance and effect of Coumatetralyl on the Brown Rat has been carried out in the Mediterranean, it seems to be the most efficient poison against *R. norvegicus* (Kaukeinen and Rampaud 1986), and problems of resistance mainly appear with Warfarin. The use of a solid cube inserted in the tube limits the risks of poisoning other animals. The Toro islets are too small to have a resident population of birds of prey. Although some Yellow-legged Gulls might nave eaten poisoned rats, we did not find any carcasses. Edwards *et al.* (1988) discuss the risks for the fauna when anticoagulant poison is used.

Occasional presence of the Brown Rat on islets

The Brown rat has been present in Corsica since at least the 6th century (Vigne and Marinval-Vigne 1985). On Lavezzi island, it has been present since at least the 14th century (Vigne and Cheylan, in prep.), but its colonization was probably more ancient on account of tne island economic importance leading to regular turnrounds of boats. The Cerbicale islands have seen limited human activity, but this was important enough to have led to the introduction of Brown Rats on all the islands except for two, Toro and Vacca. The Toro islets have never been exploited by man, but fishermen used to stop alongside them to disentangle their nets, thus occasionally allowing Brown Rats to land by swimming.

For a sample of 24 islands off Corsica, significant differences between islets with rats and those without do not appear either in relation to remoteness (Kolmogorov-Smirnov test, D = 0.30, N.S.), nor to the surface area of the island (D = 0.22, N.S.). This suggests that other factors are responsible for their arrival, such as human activities, and that the island's surface area is not the main factor leading to a successful colonization. Floristic diversity and vegetation productivity may be the main key-factors determining their success or extinction (Cheylan 1988). On Toro and Vacca, where the number of vascular plants eaten by rats is smaller than on other islands of the archipelago (Table 1), two hypotheses may be made. First, the rats have never colonized Toro islets before, but they will be able to stay after behavioural and physiological modifications (Granjon and Cheylan 1990, Granjon *et al.* 1992) and ecological adaptations (Cheylan 1988), eating for example some plants rarely used elsewhere, like *Silene velutina* (Caryophyllaceae generally not eaten, Cheylan 1988). Secondly, in the absence of good conditions for population maintainance on the islets, extinction will rapidly follow the rats' introduction; on 3 islets off the West Coast of Corsica, rats became extinct a few years after their discovery (Guyot 1989). On Toro the presence of several vertebrates sensitive to rats suggests that if colonization has previously been achieved, it was ancient and rapidly followed by extinction.

Table 5 - Comparison of density or presence of flying vertebrates between islands with rat and rat-free islands around Corsica (1) Cramp and Simmons (1977, 1983), H (2) Cramp (1985), (3) Schoeber and Grimmberger (1991) . For tests we used Fisher's Exact test and Chi^2 test; N.S. = not significant, * = P<0.05, *** = P<0.001.

Species	Weight (g) (1), (2)	Test	Number of stations (3)	Remarks
Tadarida teniotis	25-50	***	9	Significantly rare or absent where rat present
Hydrobates pelagicus	28.6	**	3	Significantly absent where rat present
Calonectris diomedea	560-730	***	11	Significant lower density where rat present
Phalacrocorax aristotelis	1,760-2,154	N.S.	33	No significant relation
Larus audouinii	500-600	N.S.	9	No significant relation
Larus cachinnans	800-1,500	N.S.	29	No significant relation
Apus pallidus	41.3	***	21	Significant lower density where rat present
Apus melba	104	N.S.	6	No significant relation
Columbia livia	200-355	***	17	Significant lower density where rat present

Perspective

It was not possible to wait for a hypothetical extinction of rats on the Toro islets. The eradication of Brown Rats seemed important to ensure the conservation of several species of vertebrates, but a new colonization will always be possible, because no law forbids landing on Toro. Risks might be lessened by prohibiting landing and anchoring at less than 300 meters around the islets (see Moors *et al.* 1989).

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Known population and distribution of cormorants, shearwaters and Storm Petrels in the Mediterranean

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Abstract — Five species of Procellariidae, Hydrobatidae and Phalacrocoracidae breed in the Mediterranean: the Cory's Shearwater *Calonectris diomedea* (57,000-76,000 breeding pairs), the Mediterranean Shearwater *Puffinus yelkouan (18,000 known breeding pairs)*, the Storm Petrel *Hydrobates pelagicus melitensis* (8,500-15,000 known breeding pairs), the Shag *Phalacrocorax aristotelis desmarestii* (about 7,000 breeding pairs) and the Cormorant *Phalacrocorax carbo* (8,000 breeding pairs). Large populations of seabirds occur on the Balearics archipelago, in the Sicilian channel and in the north of the Tyrrhenian Sea. The status of birds in the Adriatic, Ionian and Aegean Seas needs to be clarified by further survey.

Introduction

The first estimate of breeding numbers of Mediterranean seabirds was effected by James (1984), and later other surveys have been carried out, principally in the western Mediterranean. Regional and national syntheses are available for the Balearics (Aguilar 1991), France (Hémery in press), Italy (Brichetti 1992), Sardinia (Schenk and Torre 1986), Cyprus (Flint and Stewart 1992) and Bulgaria (Nankinov in press). Specifics papers have been published on the Balearic form of Mediterranean Shearwater *Puffinus yelkouan mauretanicus* (Capella and Muntaner in press), the Mediterranean form of Cory's Shearwater *Calonectris diomedea* (Thibault in press), the Storm Petrel *Hydrobates pelagicus* (Massa and Sultana 1990-91) and the Mediterranean form of Shag *Phalacrocorax aristotelis desmarestii* (Guyot in press). Paterson (1992) has summarized these data and added the Cormorant *Phalacrocorax carbo*.

The purpose of the present study is to give detailed and up-to-date data concerning the known distribution and status of these seabirds and to provide a global synthesis for the Mediterranean, including the lesser known "Levantine" form of the Mediterranean Shearwater *Puffinus y. yelkouan*. Census methods are discussed, and populations analysed. Finally, research and conservation priorities are discussed.

Species account

Cory's Shearwater *Calonectris diomedea diomedea*

Distribution. The nominate race of Cory's Shearwater, restricted to the Mediterranean sea, breeds from the Chaffarinas Islands to the Northern Sporades, Crete and the Dodecanese. It is absent from the Levantine basin, and the Marmara, Black and Azov Seas. The Balearic population has recently been estimated at 10,972 ± 2,633 pairs (Aguilar 1991). The Filfla population was estimated at 100 pairs (Borg and Sultana 1990-91) and a small colony has been found in Corsica on Gargalo Island. The global population of the subspecies is now estimated at 57,000-76,000 pairs (extreme 80,000 pairs) with 120 breeding sites (Thibault in press). This represents less than 10% of the world population. Fifty five percent of the known population breeds in the Sicilian channel (principally on Zembra and Linosa). 16% on the Balearics and 11% on Crete in the Aegean.

Research programs. This species has been much studied in the Mediterranean over the last 15 years and long term studies have been initiated in Crete, Corsica and Linosa.

Conservation. No particular trend has yet been deduced from long term studies. A population decline is probable on Malta and the Maltese Islands, due to poaching (2,000 adults shot every year). The development of tourism probably causes disturbance on the Balearics, Linosa, Gozo (Malta) and Frioul (France). Eggs are collected nowadays on Linosa at

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a rate of 3,000-4000 eggs per year. Deaths due to setlines are recorded around the Balearics, where an increasing concentration of heavy metal in birds body has also been noticed without visible consequences (Mayol 1986). Predation by rats occurs, at least on Balearics (Aguilar 1991), French coastal islands and Corsica, where it has been quantified (Daycard and Thibault 1990). Rabbits also disturb breeding on the Frioul Islands (Fernandez 1989).

Mediterranean Shearwater *Puffinus yelkouan*

Distribution. Western Mediterranean. The status of the species is now well known in the northwestern Mediterranean. The Balearic form is restricted to the Balearic archipelago where more than 3,301 ± 1174 pairs breed at 25 different sites (Aguilar 1991), with 73% of the population on Formentera. The French coast hosts 230-300 breeding pairs, distributed in seven small colonies (10-50 pairs each) on Port-Cros, Porquerolles and Le Levant Islands. Eleven to twenty one isolated breeders are also found on five islands and islets. In Corsica, a small number is known to breed on Giraglia Island (Hémery in press). Twenty five breeding sites are known around Sardinia (Schenk and Torre 1986) for an estimated total 7,500-13,000 breeding pairs. Most of the population breeds on Tavolara and Molara (6,000-9,000 pairs) and on San Pietro islands. Estimates were made by counting birds at sea around the islands and may be overestimated. Breeding has also been confirmed on Cavoli, Vacca and Maddalena Islands. In the Tyrrhenian Sea, James (1984) estimated the size of the population at 3,500 breeding pairs. The species is known to breed on Montecristo, Giannutri, Pianosa Islands (Brichetti 1992), and Salina and Vulcano Islands (Massa 1985, Iapichino and Massa 1989). Ten colonies are known in the Sicilian channel on Marettino, Levanzo and Favignano (Egadi Islands), on Lampedusa and probably on Linosa (Massa 1985, Iapichino and Massa 1989), and on Malta and the Maltese Islands (Sultana and Gauci 1982). Only two sites are known along the North African coast, on El Kala Island (Ledant *et al.* 1981) and on Zembretta (Deleuil 1958, Gaultier unpubl.) The total western Mediterranean population of this Mediterranean endemic species is estimated at 18,000 ± 4,000 pairs, distributed in 75 localities. Seventy five percent of the estimated population breeds in the north Tyrrhenian Sea. The Balearic subspecies represents 18% of the population.

Eastern Mediterranean. The species breeds on Tremiti (Brichetti 1992), the Kvarner archipelago (Lovric 1971), the Vis archipelago (Krpan 1968), and the Korcula and Lastovo Island and islets (Krpan 1976-1977). Surprisingly, only Vis and Kvarner have recently been noted as nest-sites (Lovric and Obradovic 1988). The only known breeding site in the Ionian Sea is on the Strofades Islands (Handrinos, unpubl.). In the Aegean it breeds on the Northern Sporades (three localities which include Alonnisos and Yioura Islands), Southern Sporades, the Cyclades (Naxos and Paros), and on islets off the west coast of Crete (Kumerloeve 1972, Grimmet and Jones 1989, Maggioris 1988). No evidence of breeding is yet available from Turkey (Mangin unpubl.), although birds are recorded throughout year in the Marmara Sea (Beaman 1978). On Cyprus most of the observations have been in the non-breeding season, in August and September, and are scarce from December to March during the pre-breeding period (Flint and Stewart 1992), breeding has not yet been reported (Bennett unpubl.). In the Black Sea there are three records of isolated breeding pairs on coastal islets off Bulgaria (Nankinov in press). No estimate is available for the eastern population of the Mediterranean Shearwater. It is to be noted that the "Levantine" form is not known to breed in the Levantine basin.

Research programs. The ecology of the Mediterranean Shearwater has been initiated studied since 1982 on Port-Cros Island, where a long term project has been initiated. Ringing programs are also carried out on the Balearics and Malta; data about its breeding ecology are available for both localities. It would be interesting to carry out long term studies on the *mauretanicus* subspecies and on eastern populations of the nominate subspecies.

Conservation. There has been no decrease in numbers on Port-Cros Island during the last decade, while the small population of the Marseille Islands many have decreased during the last 30 years according to Fernandez (1987). The species has disappeared from Lavezzi Island (Vigne *et al.* 1991) and from the Cerbicale Islands (Guyot *et al.* 1985), and probably decreased with man's arrival on the Balearics (Alcover 1989). Subfossil bones have been found on Palmaria Island in Liguria (Brichetti 1992) and on the mainland of Crete (Alcover *et al.* in press). Predation by rats greatly varies from one year to another and can be important (Vidal 1985). Besson (1973) recorded adult mortality due to fishing nets in the south of France. The taking of birds and eggs has now diminished in the Mediterranean but were important along the Croatian coast until the 1960s (Krpan 1967-1968), and until recently in Balearics archipelago (Mayol 1986).

Storm Petrel *Hydrobates pelagicus melitensis.*

Distribution. The Mediterranean subspecies of Storm Petrel is known to breed in the Algero-provençal basin from the Spanish coast to the

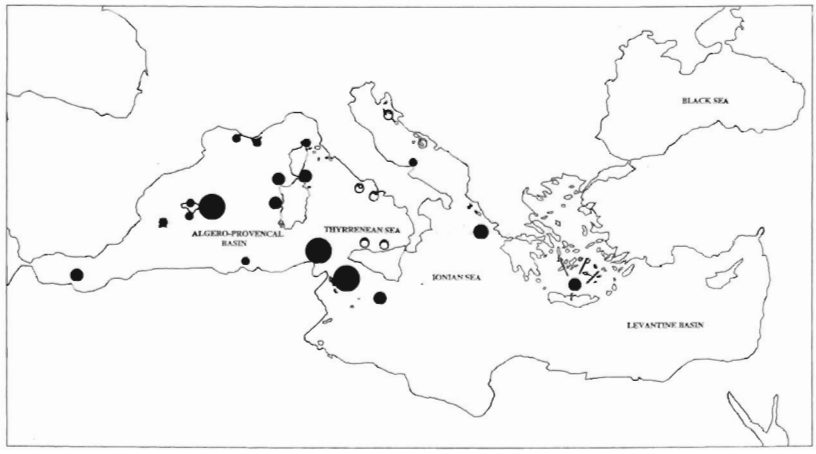

Figure 1 - Location and size of the known breeding sites of Cory's Shearwater in Mediterranean, Black and Azov Seas. Dots of increasing size represent 1-100, 101-1000, 1001-10000, and >10000 pairs; open circles: unknown numbers; probable breeding or old breeding record.

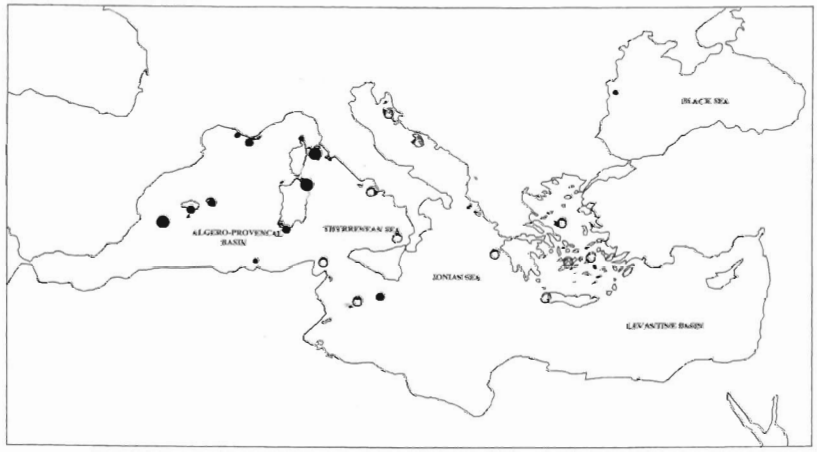

Figure 2 - Mediterranean Shearwater *Puffinus yelkouan*. Details in Figure 1.

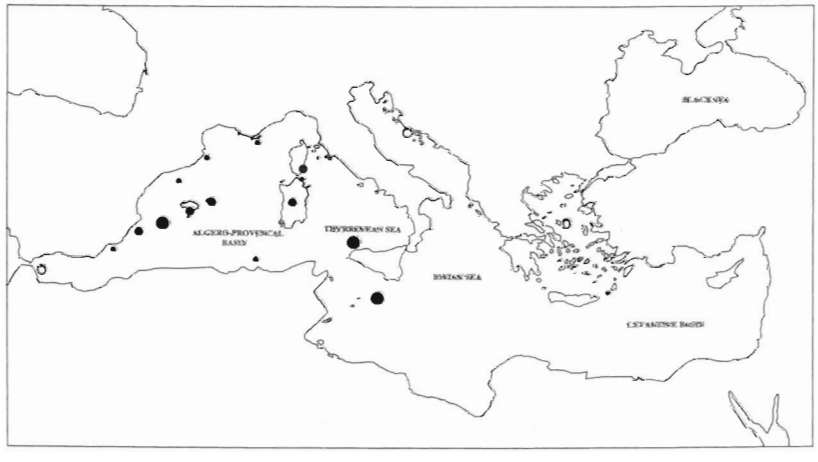

Figure 3 - Storm Petrel *Hydrobates pelagicus*. Details in Figure 1.

Sicilian channel. The Balearic population has recently been censused at about 3,000 pairs, with more than 90% on Ibiza (Aguilar 1991). It is an uncommon breeder in the Adriatic sea on the Vis archipelago (Lovric and Obradovic 1988). The only known breeding site in the Aegean is Prassoudha Island, Northern Sporades (Akriotis and Handrinos 1986), and birds have been observed along the Turkish coast (Haas 1990). The breeding status along the North African coast is not clear. The total known population does not exceed 15,000 breeding pairs. The largest colonies are in the Sicilian channel (Filfla and Marettimo Island) and on Ibiza. The other 22 known Mediterranean breeding sites host 5-300 pairs each. The total known population represents 5-10% of the world population.

Research programs. There is no long term study on this species, and data concerning its breeding ecology are scarce. It would be important to carefully survey the islets off Morocco and Algeria, and rat-free islets in the Aegean and Adriatic.

Conservation. The larges known colony of Filfla Island probably recently decreased in size, after storm modified the breeding sites (Massa and Sultana 1990-91). Predation by the Yellow-legged Gull *Larus cachinnans* and the Black Rat *Rattus Rattus* commonly occurs on coastal islets (Walmsley 1986, De Juana 1984). The development of tourism creates disturbance around Sardinia (Baccetti *et al.* 1989) and in the Sicilian channel (Massa and Catalisano 1986). Most of the known colonies are small, and Massa and Sultana (1990-91) raise the problem of the limited genetic potential of small isolated populations.

Shag *Phalacrocorax aristotelis desmarestii*

Distribution. The Mediterranean subspecies of Shag breeds principally in the Balearics, on Corsica, Sardinia and along the Croatian coast where actual numbers are unknown. It is also present in small numbers along the North African and Turkish coast, on Cyprus, in the Aegean and in the Black Sea along the Bulgarian and Ukranian coasts (Guyot in press). The Balearic population has recently been censused at 891 ± 77 pairs (Aguilar 1991). The total number of breeding birds in the Mediterranean is probably less than 10,000 pairs (Guyot in press) and represents about 12-15% of the world populations.

Research programs. The breeding and feeding ecology of this species has been studied in Corsica (Guyot 1985a and 1985b).

Conservation. A 38% decrease in number was recorded on Mallorca between 1986 and 1991 (Aguilar 1991). A similar fluctuation has been noticed in Corsica and is probably not rare.

Cormorant *Phalacrocorax carbo*

Distribution. Most of the breeding population is in the Black and Azov Seas and along the Greek coast (Paterson in press). A small coastal population is known on Sardinia (Schenk and Torre 1986). According to Paterson (in press), a few pairs breed on the Medas Islands, on the north Spanish coast. Breeding is occasional along the Algerian coast on Agueli Island (Boukhalfa 1991). A total of less than 8,000 pairs breed around the Mediterranean (Paterson in press), 14% of the north Atlantic population.

Research programs. There is no program on this species. Study of the isolated Sardinian population appears important for the future.

Conservation. Populations are decreasing in Bulgaria (Nankinov in press), but are increasing in Romania and the Ukraine (Paterson in press).

Discussion

Knowledge of the status and numbers of these species is fragmentary around the Mediterranean. Future investigations should consider the Adriatic, Ionian and Aegean Seas where numeric data are scarce and generally old. There is also an important lack of survey along the North African coast. Most of the population of the Tuscan archipelago, Sardinia and the Sicilian channel has been estimated, and it would be interesting to conduct exhaustive censuses. Further censuses need to use a common methodology and to be synchronised. The species reviewed here, except for the Cormorant, are strictly dependent on marine resources. They are the only pelagic seabirds that breed in the three million square kilometers of the Mediterranean and Black Sea. Moreover, they do not commonly breed sympatrically and the total number of breeders in each colony is generally low. Large populations of seabirds only occur in three different areas of the western Mediterranean: the Balearic archipelago, the Sicilian channel and the north Tyrrhenian Sea. Mediterranean seabirds populations have undoubtely been drastically affected by human presence in their breeding grounds since the Neolitic and most present - day colonies are probably relict. However the distribution of seabirds is primarily determined both by pelagic food availability and potential breeding biotope. Further studies should contribute to determine the exact place of each seabird species in the Mediterranean ecosystem. Seabirds are generally highly philopatric. It is therefore important for further conservation plans to determine the isolation level of the small populations in each species.

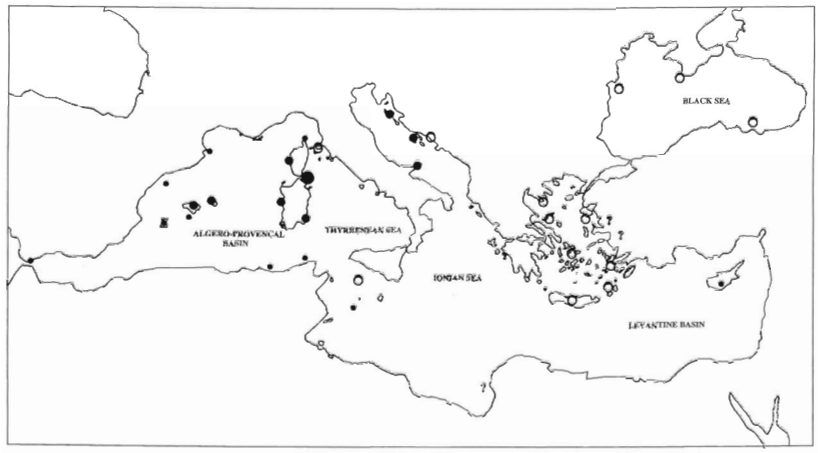

Figure 4 - Shag *Phalacrocorax aristotelis*. Details in Figure 1.

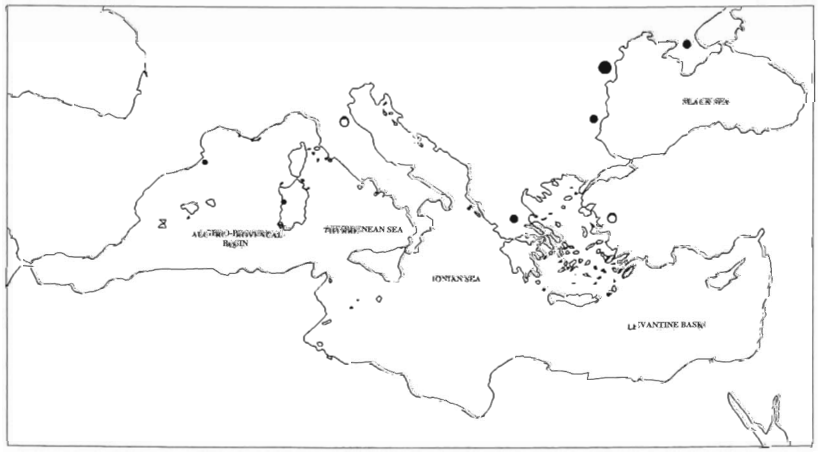

Figure 5 - Cormorant *Phalacrocorax carbo*. Details in Figure 1.

Table 1 - Status of shearwaters, Storm Petrels and cormorants in Mediterranean, Black and Azov seas (number of breeding pairs).

Locality	Species					References
	Calonectris diomeda	*Puffinus yelkouan*	*Hydrobates pelagicus*	*Phalacrocorax aristotelis*	*P. carbo*	
Iberian coast	(1)		(2)	(3)	(4)	
Gibraltar	—	—	—	4-5	—	(1): Thibault in press
Hormingas	—	—	30	—	—	
Cuevas de lobos	—	—	≥2	—	—	(2): Massa and Sultana 1990-1991
Palomos	≥29	—	≥15	—	—	
Terreros	≥—	—	—	—	—	
Hitjana	—	—	≥25	—	—	(3): Guyot in press
Benidorm	—	—	100-200	—	—	
Nova Tabarca	—	—	10-20	—	—	(4): Paterson in press
Columbretes	170-200	—	≥10	(+)	—	
Medas	—	—	5-15	(+)	2-3	(5): Aguilar 1992
Balearics	(5)	(5)	(5)	(5)	(5)	
Mallorca	214±69	400±123	17±5	517±45	—	(6): Hémery in press
Menorca	10,075±2453	125±33	50	186±18	—	
Ibiza	313±47	344±86	2786±1120	62±5	—	(7): Schenk and Torre 1986
Formentera	60	2410±885	breed?	54±5	—	
Cabrera	427±64	22±7	59±9	72±9	—	
French coast	(6)	(6)	(6)	(6)	(6)	
Frioul	56-80	2-5	—	—	—	
Riou	132-162	8-15	10-20	—	—	
Porquerolles	110-130	50	—	—	—	
Bagaut	5	1	—	—	—	
Port-Cros	40-50	80-100	—	—	—	
Le Levant	40-60	100-150	—	—	—	
Corsica	(6)	(6)	(6)	(6)	(6)	
Giraglia	30	1-10	—	10-185	—	
Cerbicales	79-115	—	70-90	100-500	—	
Lavezzi	312-466	extinct	—	50-310	—	
West coast	—	—	—	45-100	—	
Bonifacio	10-50	—	—	—	—	
Gargallo	6-10	breed?	—	—	—	
Finocchiarola	—	—	—	10-20	—	
Sardinia	(1)	(7)	(3)	(4)		
Asinara	breed?	breed?		80-100	—	
Maddalena	>1,000	—		50-300	—	
Alghero area	1,500-2,000	—		290	35-45	
Costa Smeralda	—	—		145	—	
Figarolo	+	—		+	—	
Tavolara/Molara	+	6000-9000	3 localities	145	—	
Toro	300-400	—	around	—	—	
Vacca	—	+	Sardinia	+	—	
Cavoli	—	+	2 small	—	—	
Pan di Zucchero	+	—	and one >300	—	—	
San Pietro	—	500		+	—	
Orosei/Quirra	—	—		200-400	—	
Costa Paradisea	—	—		120	—	
Mal di Ventre	—	—		40-60	—	
S. Catarina area	—	—		+	—	
Tuscan arch.	(1)	(2)	—	(3)		
Capraia	100-150	breed?	—	—	—	(1): Tribault in press
Gorgona	breed?	breed?	—	5-10	—	
Elba	50-60	breed?	—	breed?	—	(2): Brichetti 1992
Pianosa	+	+	—	4-7	—	
Montecristo	breed?	+	—	—	—	(3): Guyot in press

Italian Coast	(1)	(2)				
Ponziane	+	+	—	—	—	(4): Massa and Sultana 1990-1991
Ustica	+	—	—	—	—	
Ischia	+	—	—	—	—	
Giglio	breed?	breed?	—	—	—	(5): Borg and Sultana 1990-1991
Aeolian	+	—	—	—	—	
Giannutri	—	+	—	—	—	
Sicilian channel	(1)	(2)	(4)	(3)		(6): Paterson in press
Levanzo	—	+	—	—	—	
Favignano	—	+	—	—	—	(7): Moutou unpubl
Marettimo	<100	+	>1,000	—	—	
Sicily	—	breed?	breed?	—	—	(8): Deleuil 1958
Pantelleria	<1,000	+	—	—	—	
Lampione	>400	breed?	+	—	—	(9): Ledant *et al.* 1981
Lampedusa	+	+	—	30-40	—	
Linosa	>10,000	breed?	—	—	—	(10): Boukalfa 1990
Malta	+	500 (6)	—	—	—	
Gozzo	100-2,000	—	—	—	—	(11): Lovric and Obradovic 1988
Filfla	<100 (5)	breed?	2,500-10,000	—	—	
African coast	(1)		(7)	(3)	(10)	
Lybian coast	—	—	—	breed?	—	(12): Krpan 1967-1968
Zembra	20-25,000	—	—	10	—	
Zembretta	—	—	—	1-2	—	
La Galite	>12	+(8)	—	+	—	
Colombi	—	—	—	+	—	
Cap Tenes	—	—	—	+	—	
Ronde Is.	—	—	—	+ (20-40)	—	
San Piastre	—	—	—	+	—	
El Kala	—	8-12 (9)	—	+	—	
Srigina	—	—	—	+	—	
Collo	20	—	—	—	—	
Habibas	>20	—	breed?	—	—	
Rachgoun	100-1,000	—	—	—	—	
Agueli Is.	—	—	—	—	+	
Chaffarinas	1,000-3,000	—	—	—	—	
Adriatic Sea	(1)		(11)	(3)		
Tremiti	250-350	100-150(2)	—	100-150	—	
Kvarner	+	+ (12)	—	800-1,000	—	
Dalmatian Is.	+ (70-75)	+ (12)	+	100-150	—	
Istria	—	—	—	+	—	
Cornati	—	—	—	+	—	
Croatian coast	—	—	—	—	—	
Ionian Sea	(1)	(2)				
Corfu	+	—	—	—	—	(1): Thibault in press
Zakhinthos	+ (5,000)	—	—	—	—	
Strofades	+	+	—	—	—	
Kythira	+	—	—	—	—	(2): Handrinos
Aegean Sea	(1)			(3)	(4)	
Greek coast	breed?	—	—	—	180	
Crete	2,5	extinct?(5)	—	—	—	(3): Guyot in press
Dyonidiades	+	—	—	+	—	
Naxos	breed?	+ (6)	—	+	—	(4): Paterson in press
Fournoy	breed?	+ (7)	—	breed?	—	
Youra	—	breed? (6)	—	—	—	
Siros	+	—	—	+	—	(5): Alcover *et al.* in press
Alonnisos	—	+	—	—	—	
Thassopula	—	—	—	+	—	
Vorioi Sporades	+	—	+	+	—	(6): Grimmet and Jones 1992
Prassoudha	—	—	—	—	—	
Kassos	+	—	—	+	—	
Saria	+	—	—	+	—	(7): Kumerloeve 1972
Chios	—	—	—	+	—	
Rhodos	—	—	—	+	—	

Cyprus				(4)	
Klidhes	—	—	—	+	—
Epishopi	—	—	—	+ (40-54)	—
Akrotiri	—	—	—	+	—
Cape Aspro	—	—	—	bredd?	—
Cape Kormatiki	—	—	—	breed?	—
Aios Yeorgios	—	—	—	breed?	—
Orka	—	—	—	breed?	—
Mazaki	—	—	—	breed?	—
Turkey				(3)	(2)
West Turkey	—	—	—	+	+
North Turkey	—	—	—	—	+
Gelindere	—	—	—	+	—
Bulgaria		(8)		(8)	(8)
Zmiiski	—	(+)	—	—	—
Silistar	—	(+)	—	—	—
Cape Kaliakara	—	—	—	25-30	—
Vardim	—	—	—	—	+
Persina	—	—	—	—	+ (280-600)
Utova	—	—	—	—	+
Srebuna	—	—	—	—	22
Romania					(4)
Danube delta	—	—	—	—	+
Martinka lake	—	—	—	—	+ (7,000)
Purcellu	—	—	—	—	+
Mures valley	—	—	—	—	+
Ukraine				(3)	(4)
Tarkhanhut pen.	—	—	—	+	—
Balaclava	—	—	—	+ (800)	—
Mouth of Azov	—	—	—	+	—
Kartinitsky	—	—	—	—	>356
Ivano-Frankivitsh area	—	—	—	—	11

+: number of breeders unknown
(+): irregular breeder

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Avocetta N° 16: 127-129 (1992)

Book reviews

Mearns B. and R. 1992. Audubon to Xantus. The lives of Those Commemorated in North American Bird Names. *Academic Press Limited. London,* 588 pp.

È uscito alla fine del 1992 il bel volume di Richard e Barbara Mearns che tratta le biografie dei personaggi il cui nome identifica, scientificamente o volgarmente, taxa di uccelli nordamericani.
L'opera in questione segue a distanza di quattro anni un primo volume della stessa serie, che riportava le biografie di coloro che erano ricordati nei nomi latini ed inglesi degli uccelli del Paleartico occidentale. Entrambi i volumi rappresentano un esempio di come si possa lavorare in modo serio e scientifico nei vari campi dell'ornitologia e, in particolare, in quello della storia della Zoologia e degli Zoologi. Tale campo risulta generalmente poco approfondito in Italia, mentre ciò non si può dire per la Gran Bretagna in cui assistiamo ad una continua produzione libraria di questo tipo, in accordo con il pensiero del grande matematico inglese Whitehead che affermava che una scienza che tenda a dimenticare i suoi fondatori - e, perchè no, anche i suoi gregari - è sicuramente destinata a perdersi.
La conoscenza della vita e dell'attività di ornitologi importanti e di statura minore, i motivi di determinate loro scelte, le modalità di costituzione delle collezioni ornitologiche non portano evidentemente in modo diretto al progresso della scienza, ma rappresentano certamente la base per molti tipi di ricerca e possono contribuire a correggere errori di interpretazione o a comprendere determinati atteggiamenti di un autore, o l'esatta provenienza di un esemplare. Rappresentano in ogni caso un doveroso omaggio a quanti ci hanno preceduto nello stesso campo, la cui opera si tende oggi talvolta a dimenticare troppo facilmente.
L'ultimo lavoro dei Mearns tratta, in modo decisamente piacevole, più di 100 biografie, corredate da 82 ritratti in bianco e nero della maggior parte dei personaggi considerati e da oltre 120 figure al tratto rappresentanti le varie specie, inserite, nel limite del possibile, nel loro ambiente naturale. Tali disegni si devono all'abile penna di Dana Gardner, specialista appunto nell'illustrazione di testi ornitologici.
Al termine delle biografie è riportata una esaurientissima bibliografia per ogni singolo personaggio e, ancora, un'appendice in cui compare una selezione dei naturalisti ricordati nei nomi di razze di uccelli ben conosciute o di ibridi, o in nomi da poco tempo non più utilizzati, o, ancora, in epiteti di specie che sono considerate come visitatrici accidentali degli Stati Uniti e del Canada.
Al fondo del volume poi troviamo un indice dei nomi inglesi e scientifici degli uccelli trattati nel testo e l'indice dei personaggi citati.
Dal lavoro emerge una incredibile massa di nomi, alcuni notissimi anche ai non ornitologi per la loro attività o per la famiglia di appartenenza, fra cui, ad esempio, Audubon, Bonaparte, Ross e Steller, ed altri assolutamente sconosciuti come il Dr Alexandre, o i fratelli Paris, o Wollweber, i quali peraltro rimangono tali anche dopo le accuratissime ricerche dei coniugi scozzesi. Pochi, anzi pochissimi gli italiani: Federico Craveri di Bra, uno dei fondatori dell'omonimo Museo; Ernesto Mauri, direttore dell'Orto botanico romano; il modenese Antonio Vallisneri e i savoiardi, ma sudditi piemontesi, Vittorio Arminjon, comandante della R. Corvetta Magenta e Luigi Costa di Beauregard, Gran Scudiere del re Carlo Alberto. D'altra parte molti fra i viaggiatori italiani si rivolsero principalmente all'esplorazione di varie regioni dell'America meridionale e i pochi nostri ornitologi di fama, pur avendo descritto moltissime specie extrapaleartiche, sono stati in genere poco ricordati dai colleghi nelle loro dediche e, soprattutto, nei nomi inglesi.
Nel complesso il volume dei Mearns risulta oltremodo piacevole da leggere anche per i non appassionati di argomenti storici, risultando ricco di spunti e notizie, molti dei quali inediti, dai quali traspare l'incredibile attività che, nel corso degli ultimi tre secoli, è stata rivolta allo studio della fauna ornitica nordamericana, attraverso fatiche e peripezie quasi sovrumane, fra mari in tempesta, naufragi, fiumi in piena, guerre civili, nordisti e sudisti, carovane di pionieri e assalti di pellerossa, in terre sconosciute e talvolta inospitali. Si trova insomma, leggendo le varie biografie, di appropriata lunghezza, non solo la storia dell'ornitologia americana, ma la storia stessa dell'America, intrecciata perlopiù strettamente con quella dell'Europa. Si tratta dunque di un libro decisamente raccomandabile non solo per gli Ornitologi, ma anche per tutti gli amanti della Storia Naturale.

Pietro Passerin d'Entrèves

Gensbøl. B. 1992. Guida ai rapaci diurni d'Europa. Nord Africa e Medio Oriente. *Zanichelli, Bologna,* 367 pp.

La nota opera di Benny Gensbøl è finalmente disponibile in versione italiana nella traduzione di Mario Chiavetta.
La guida fornisce una grande quantità di dati sulla biologia di 46 specie di rapaci diurni nidificanti nel Paleartico occidentale presentando ben 180 foto e 300 illustrazioni per la loro identificazione sul campo.
Un capitolo iniziale descrive le caratteristiche generali di questi uccelli, il loro adattamento all'ambiente, la biologia e le minacce dirette o indirette che mettono a rischio la sopravvivenza delle popolazioni naturali nei loro areali di distribuzione. Nel testo sono riportate la distribuzione (anche quella delle sottospecie), una stima degli effettivi con le previsioni a medio e lungo termine sull'evoluzione delle popolazioni, l'ambiente frequentato, le vocalizzazioni e le principali caratteristiche del comportamento riproduttivo e alimentare. I dati quantitativi riportati sono riferiti all'edizione originale del 1984; per la situazione italiana Chiavetta ha comunque aggiunto un contributo personale presentando aggiornamenti fino al 1990. Una importante sezione chiarisce i rischi di confusione di una specie con le altre e fornisce indicazioni preziose sugli elementi per il riconoscimento delle specie in volo, sull'età, le dimensioni, il piumaggio e le caratteristiche del volo. Per quasi tutte le specie trattate, oltre alle foto o alle silhouettes sono inoltre presentate mappe sulla distribuzione e gli spostamenti migratori.
Grazie a queste caratteristiche il libro costituisce una fondamentale guida da campo e un testo essenziale per la conservazione di questi uccelli che pur rivestendo un ruolo insostituibile negli ecosistemi naturali continuano ad essere minacciati dalle attività umane.

Giacomo Dell'Olmo

Fowler J. e Cohen L. 1993. Statistica per ornitologi e naturalisti. *Franco Muzzio, Padova* 240 pp.

L'ornitologia è tra le discipline biologiche quella che più di tutte vede verificarsi una commistione, o forse meglio una contaminazione, tra gli sforzi e le attitudini del mondo dei dilettanti colti, dei semidilettanti, o dei neofiti affatto digiuni di metodologie di misurazione, e l'onesto e competente contributo degli "addetti ai lavori": si intendano per questi ultimi ricercatori che abbiano maturato, magari con l'ausilio di un congruo periodo di formazione presso istituzioni scientifiche estere, una professionalità di standard europeo, fondata sulla personale storia vocazionale, che non di rado risale agli anni giovanili.
L'Italia è nazione dove la zoologia dei Vertebrati, e l'ornitologia in particolare, hanno avuto vicende alterne - con l'estinzione di scuole di reputazione europea e il più recente diffodersi di varii nuclei di ornitologi professionisti, che hanno finalmente riportato questo paese mediterraneo verso standard centroeuropei. Ma è oggi davvero importante che le strutture deputate alla formazione universitaria e post-universitaria - ma anche strutture locali a carattere museale, conservazionistico, di associazionismo di massa - non sprechino talenti e soprattutto energie potenzialmente utili per acquisire importanti (talora urgenti) conoscenze naturalistiche di base, necessarie per un'adeguata caratterizzazione della faunistica italiana.
Talenti ed energie che potrebbero essere utilmente indirizzati verso un *minimum* di rigore metodologico, tale da permettere raccolte di dati, osservazioni sistematiche, semplici analisi interpretative che potrebbero divenire - anche in tempi brevi - un patrimonio importante di conoscenze di base: per esempio, sullo stato riproduttivo delle specie italiane, sulle rotte migratorie nazionali, sulla correlazione tra fenomeni meteorologici atipici e la frequenza di determinate specie visitatrici , ecc. Né mancherebbero spunti applicativi, quali valutazioni d'impatto ambientale che utilizzassero indicatori ornitici, monitoraggio da parte delle autorità da sanità pubblica del rischio zoonotico o delle popolazioni sinantropiche "infestanti", oppure competenze a carattere nazionale, regionale o locale sulla qualità degli ambienti.
È per questo che la comparsa in libreria di questo originale e poco costoso volume a carattere manualistico va considerata un'occasione di crescita e di diffusione per una professionalità di naturalista che non di rado difetta a chi è al di fuori, o ai margini, del settore accademico o scientifico vero e proprio.
Il volume è una rassegna piuttosto completa dei metodi di analisi statistica applicati alla biomedicina e include tecniche poco diffuse nei testi di base, quali l'analisi dei dati con distribuzione circolare o l'analisi multidimensionale dei dati (Discriminante, Cluster, Componenti principali o Fattoriale, Cap. 19). La presentazione dei test non parametrici è ampia (anche se il volume non include Friedman e Kruskal-Wallis), sia pure con alcune superficialità di trattazione. Ma è soprattutto la ricchezza degli esempi a renderlo particolarmente fruibile per un biologo o un naturalista, sovente poco propenso ad addentrarsi negli algoritmi matematici dei test statistici, ma uso a seguire pedissequamente uno schema di analisi applicato ad una situazione simile al proprio caso sperimentale. Il florilegio di esemplificazioni naturalistiche comprende cinciarelle in giar-

dino (p. 85), o la matrice di correlazione tra cinque tipologie di comunità arborea, utilizzate per illustrare pregi e limiti di predittibilità dell'analisi discriminante.

Per il palato fine del biostatistico il testo non è però immune da qualche pecca. Per esempio, i modelli per l'ANOVA (Cap. 18) non comprendono più di due fattori tra soggetti nè disegni a blocchi randomizzati. In generale il linguaggio utilizzato non è rigoroso: è scritto "accettare l'ipotesi H_0", ma si dovrebbe invece scrivere che non si hanno elementi per rifiutare l'ipotesi nulla (p. 77). Si parla di "mediana" anche nel caso di un numero pari di osservazioni, mentre sarebbe giusto dire "intervallo mediano sintetizzato dalla media dei due valori centrali della distribuzione" (p. 38).

Nell'istogramma di pag. 27 non è spiegato che è l'area di ciascun rettangolo ad esser proporzionale alla frequenza, fatto rilevante soprattutto qualora le classi in cui è raggruppata la variabile osservata non siano di eguale ampiezza. Il coefficiente di correlazione (p. 97) *non* è un test statistico, bensì una statistica su cui si può basare un test. Parlare di devianza è inappropriato a p. 171, scostamento o deviazione suonerebbero meglio. Eccetera, eccetera, eccetera.

Anche la traduzione in qualche punto è imprecisa: "statisti" anziché "statistici" (p. 83), esperti inseriti in una frase di fine pagina ben poco comprensibile; né graficizzazione o graficizzato suonano termini correnti. Ma se il fine è quello di mettere a disposizione del pubblico italiano un agile manualetto che tratteggi gli elementi di base che un naturalista dovrebbe acquisire per la propria professionalità, questo traguardo è pienamente raggiunto. E la bella copertina prevedibilmente aiuterà ad attirare gli acquirenti.

Flavia Chiarotti e Enrico Alleva

Corvi di Inverno. Segnaliamo che la *Franco Muzzio Ed.* ha tradotto nella collana "Il corvo e la colomba" il libro di Henrich B. "Ravens in winter", recensito nel Vol. 16 (1992) N. 1 di Avocetta.

Avocetta N° 16: 130-132 (1992)

Notices

VII Convegno Italiano di Ornitologia - Urbino 1993

Organizzato da Massimo Pandolfi (Università di Urbino) e Ugo Foscolo Foschi (Museo Ornitologico di Forlì) il 7° Convegno Italiano di Ornitologia avrà luogo a Urbino (PS) nei giorni 23-24-25 e 26 Settembre 1993. Urbino è stata scelta anche per la sua buona disponibilità convegnistica; infatti i lavori si terranno presso i College universitari che, con numerose aule, mensa e alloggi accorpati, si sono già dimostrati "contenitori" per i nostri convegni e dove, altre alle sessioni principali, potranno essere agevolmente organizzate sessioni specifiche, tavole rotonde e seminari.

Programma

Mercoledì 22 settembre

17,00 Registrazione partecipanti
20,00 *Cena*

Giovedì 23 settembre

Mattino: Aula Magna della Facoltà di Magistero
8,30 Registrazione partecipanti
9,30 Inaugurazione del Convegno
10,15 *Coffee break*
10,30 Storia dell'Ornitologia Italiana e Collezioni Storiche
Coordinatori: Sergio Frugis e Carlo Violani
12,30 Presentazione poster
13,00 *Pranzo*

Pomeriggio
Collegi Universitari - Sala "La Vela"
14,30 Ecologia ed Etologia nelle strategie riproduttive degli uccelli
Coordinatori: Francesco Dessì e Nicola Saino
17,30 *Coffee break* - Presentazione poster
18,00 Gruppo di lavoro: Cartografia, Ornitologia e sistemi computerizzati
Coordinatore: S. Gellini
19,00 "Spazio idee e presentazione libri"
20,00 *Cena*
21,00 Gruppo di lavoro aperto su: Atlanti urbani e sistemazione degli atlanti dei nidificanti e degli svernanti.
Coordinatori: B. Cignini, M. Dinetti e G. Truffi

in contemporanea:
Riunione Comitato di Omologazione Italiano
Coordinatori: P. Brichetti, M. Fasola

Venerdì 24 settembre

9,00 Comportamento e Strategie alimentari
Coordinatori: Mauro Fasola e Paolo Boldreghini
11,00 *Coffee break*
12,00 Presentazione poster
13,00 *Pranzo*
14,30 Problemi di gestione e tecniche di conservazione dell'ornitofauna
Coordinatori: Giuseppe Bogliani e Toni Mingozzi
17,30 *Coffee break* - Presentazione poster
18,00 Gruppo revisione: Lista Rossa degli Uccelli
Coordinatori: S. Frugis, F. Petretti
19,00 "Spazio idee e presentazione libri"
20,00 *Cena*
21,00 Assemblea ordinaria dei soci del C.I.S.O.

Sabato 25 settembre

9,00 Migrazione ed Homing
Coordinatori: Natale Emilio Baldaccini e Fernando Spina
11,00 *Coffee break*
11,15 Gruppo Fauna d'Italia
Coordinatori: P. De Franceschi, P. Brichetti
12,00 Presentazione poster
13,00 *Pranzo*
14,30 Seminario patrocinato dalla provincia di Pesaro e Urbino: *Biologia e Gestione dei Galliformi applicazione della legge 157/92 e redazione dei piani faunistico-ambientali*
19,00 "Spazio idee e presentazione libri"
20,30 *Cena sociale*

Domenica 26 settembre

9,00 Status e distribuzione delle specie italiane nel paleartico
Coordinatori: Fulvio Fraticelli e Francesco Petretti
11,00 *Coffee break*
13,00 *Pranzo*
14,30 Gruppo di lavoro *Circus*
Coordinatori: M. Pandolfi, P. Giacchini

- altri interventi da definire

Congress of the Colonial Waterbird Society

The next Congress of the *Colonial Waterbird Society* will take place in Arles from 6 to 10 October 1993. The first day will be devoted to a symposium on the *Study and Conservation of Colonial Waterbirds in Mediterranean countries.*
The rest of the congress wil be devoted to more general papers on the biology and ecology of colonial waterbirds (including seabirds) and to plenary sessions.
Contact:
Dr. Frank Cézilly, chair of the scientific programme Colloque Colonial Waterbird Society,
c/o Station Biologique del la Tour du Valat, Le Sambuc, 13200 Arles, France.

Sixth International Grouse Symposium

University Centre, Piazza Antonini 8, Udine, Italy. 20-24 September 1993.
For informations write to:
Tim Lovel (Grouse Symposium),
Holywell Hall, Broncepeth, Durham DH7 8EQW, G.B.

Predatori dell'Ifantria - Richiesta di informazioni

Il Consorzio Fitosanitario di Reggio Emilia promuoverà nel 1993 la pubblicazione di un volume monografico sulla Ifantria Americana, Lepidottero defogliatore ormai diffuso in gran parte del Nord Italia. Il volume comprenderà anche un paragrafo sugli Uccelli predatori dell'Ifantria; chiunque voglia contribuire alla raccolta dei dati su questo argomento, può rivolgersi al seguente indirizzo: Giuseppe Camerini, Strada del Porto 9, Bastida P. (PV) tel. 0383/85063.
Con la richiesta di informazioni intenderei appurare se, oltre alle osservazioni che ho avuto modo di fare in provincia di Pavia, sono in corso altre ricerche sulla predazione dell'Ifantria Americana da parte dell'avifauna nei territori italiani fino ad ora invasi da questo Lepidottero di origine esotica. Nel volume monografico cui si fa riferimento, infatti, sarà importante poter delineare l'intero quadro delle conoscenze sulla Ifantria per quanto riguarda il territorio italiano.

Giuseppe Camerini
Via Strada del Porto, 9
27050 Bastida Pancarana (PV)
tel. 0383/85063

Request for information: Birds of the Serengeti

The birds of the Serengeti National Park Tanzania, B.O.U. Checklist No. 5 by Dieter Schmidl will soon be out of print and the author will therefore revise the data for a new printing.
Please send *Serengeti records* to:
Dieter Schmidl,
Max-Planck-Institut, D-82319 Seewiesen, Post Starnberg, FRG. Any records would be gratefully received and acknowledged.

Neornithes: Nomina Avium
Sequenza convenzionale degli Uccelli del Mondo

Lavoro di ornitologia per computer IBM o compatibile: una Banca Dati degli uccelli conosciuti e viventi di tutto il mondo strutturato secondo la sequenza classificatoria convenzionale che permette di attingere a qualsiasi informazione, interscambiando la ricerca dai dati tassonomici: Ordine, Famiglia, Genere, Specie e Sottospecie. E che contempla, oltre al nome del Classificatore, il nome italiano e il nome inglese della specie, la Distribuzione Geografica della sp. e della ssp., le Note Tassonomiche, un indicativo (*) delle Specie Europee e la Numerazione Mondiale [w.n.] secondo il sistema numerale adottato dalla American Ornithologist Union (A.O.U.).
Una mole di informazioni la cui ricerca è istantanea e molto semplice.
Attivando, per esempio, "SPECIE" e inserendo il nome specifico latino, immediatamente visualizza la scheda con l'indicazione delle eventuali sottospecie e relativa distribuzione geografica. Nel caso di omonimia sono indicati tutti gli omonimi di specie con l'indicazione della Famiglia di appartenenza, consentendo velocemente la ricerca proposta.
Analoga procedura vale per la ricerca dalla "SOTTOSPECIE".
Per ogni dato costituente la scheda è proponibile una interrogazione: così dall'ORDINE, tutte le famiglie o tutti i Generi. Dalla FAMIGLIA, tutti i Generi o tutte le Specie. Dal GENERE, la prima scheda del Genere richiesto o tutte le Specie. Dalla SPECIE, tutte le Sottospecie e relativa Distribuzione Geografica. Dalla SOTTOSPECIE, tutti i dati disponibili. Dal NOME ITALIANO e dal NOME INGLESE, tutti i dati disponibili.
Il programma consente l'immissione di nuovi dati modificando quelli esistenti.
La nomenclatura inglese rispetta i canoni della B.O.U., della A.O.U. e la etimologia del Parkes (1978).
La nomenclatura italiana (Progetto) è la traduzione del nome latino o del nome inglese o la derivazione incrociata dallo spagnolo, francese e inglese.

In alcuni casi, pe le specie endemiche, utilizza la terminologia di base del luogo d'origine.
Il relativo software contempla oltre all'Archivio e al Programma principale denominato "Avium", il Programma "STAMPE" che permette di stampare oltre ai dati del programma principale, quelli propri caratterizzati da funzioni diverse e in ordine sequenziale.
Optional, cartografia computerizzata a colori della distribuzione geografica per famiglia e in molti casi per singola Specie o Genere. Un magnifico atlante ornitologico!
"Neornithes: Nomina Avium" è la Banca Dati dell'Ornitologo, del Ricercatore, del Giornalista del Professore... non dovrebbe mancare nei Musei, nelle Scuole, nelle Biblioteche e presso le Associazioni Naturalistiche... e a casa *nel tuo computer*!
Da oggi, è disponibile la prima parte:
Non Passeriformes
12.065 schede. 32 Floppy-disk. Programmi: Avium + Stampe e DBase.

Lire 350.000

La seconda parte: *Passeriformes, 1° (Giugno 1993) a Lire 300.000.*

La terza parte: *Passeriformes, 2° (Marzo 1994) a Lire 300.000.*

Optional: Cartografia computerizzata a colori completa per il "Neornithes", (marzo 1994), Prezzo da definire.

Su richiesta, si personalizza la maschera di ingresso al Programma.

N.B.: Hardware richiesto:
** PC IBM COMPATIBILE, Video Colori, DOS 3.3 o superiore
Configurazione consigliata:
** CPU 386 o superiore
** RAM minimo 1 KB
** HD minimo 40 MB

Per informazioni dettagliate contattare l'autore:
Alberto Masi
Viale Piacenza Nuovo n. 48
43100 Parma (PR)
Tel. 0521-42629-42658 anche Fax, 986308, casa.

Letter to the editors.

Dear Colleagues,
the more and more evident deterioration of the environment provoked by several human activities, commends that everyone try to operate in order to correct or even repress this trend.
I believe that, as scientists and editors of scientific journals, we can provide our particular contribution. As editor of ELYTRON - Bulletin of the European Association of Coleopterology, I have decided, in keeping with authoritative and reliable Colleagues, not to publish papers deriving from researches capable to endanger the environment or the biodiversity (unnecessary large and destructive samplings, tests implying permanent habitat alterations, genetic manipulations of wild organisms, not severely justified introductions of exotic species in natural communities, etc.). I also propose that a self-regulation code in this field is worked out so that in the future all us have to respect it.
This letter is sent to the Editors of about 200 scientific Journals of Natural Sciences all around the word. If you agree with the aim of this proposal, please, publish this letter on your Journal in the form and in the language you consider more appropriate. That will contribute to start a debate from which, I hope, we will be able to obtain suggestions and advice to elaborate a more complete and organic proposal.

Yours sincerely
Mario Zunino

Norme per gli autori

AVOCETTA pubblica articoli originali, brevi note, sintesi di aggiornamento, commenti, corrispondenze e recenzioni, su argomenti che coprono l'intero campo dell'ornitologia. Verrà tuttavia data la preferenza a lavori sperimentali sull'ecologia, l'etologia, la zoogeografia della fauna ornitica della regione mediterranea e delle zone alpine.
I lavori sottoposti saranno valutati da referees e, in conseguenza dei suggerimenti da loro effettuati, saranno accettati, rinviati agli autori con proposte di modifiche, o respinti. tale decisione è competenza definitiva degli *editors*.
I lavori sottoposti in italiano, inglese o francese, devono essere dattiloscritti con interlinea 2, ampi margini, su una sola facciata e devono essere forniti in **tre** copie, complete di illustrazioni. L'autore indicherà a matita sul margine sinistro del dattiloscritto la posizione in cui illustrazioni e tabelle vanno inserite nel testo.
Il testo degli articoli dovrà essere diviso come segue:
— Titolo
— Cognome e nome dell'Autore
— Indirizzo dell'Autore
— Testo del manoscritto, diviso nei seguenti capitoli: Riassunto, Introduzione, Metodi, Risultati, Discussione, Ringraziamenti, Riassunto in lingua diversa da quella dell'articolo, Bibliografia
— Tavole e figure

Il **riassunto iniziale**, di un massimo di 40 righe, elencherà schematicamente tutti i problemi trattati ed i risultati ottenuti senza riferimento diretto al testo e senza ripetere l'informazione contenuta nel titolo. Nel riassunto non devono comparire abbreviazioni e simboli specialistici.

Il problema principale affrontato nel lavoro va esposto chiaramente nell'**introduzione** senza eccessivi dettagli storici. La continuità con altre ricerche va posta in evidenza con gli opportuni riferimenti bibliografici evitando la ricapitolazione di questi stessi lavori. I metodi devono essere espressi con chiarezza ma senza introdurre dettagli particolareggiati, tranne quando si tratti di un lavoro metodologico innovativo.

I nomi di **genere e di specie** e le parole da evidenziare devono essere sottolineati (per il carattere corsivo). I nomi comuni di animali vanno scritti maiuscoli.

Le **citazioni bibliografiche** nel testo possono essere date come: Mayr (1963), Andrewartha e Birch (1984), Fasola *et al.* (1987) o alla fine della frase (Mayr 1963, Fasola *et al.* 1987).
Le citazioni devono conformarsi ai seguenti esempi:
Capitolo: Baldaccini N.E., Benvenuti S., Fiaschi V., Ioalé P. e Papi F. 1982. Pigeon orientation: experiments on the role of olfactory stimuli perceived during the outward journey. In: Papi F. e Wallraff H.G., Edits. Avian navigation. *Springer, Berlin* pp. 160-169.
Libro : Lack D. 1954. The natural regulation of animal numbers. *Clarendon Press, Oxford.*
Rivista : Papi F. 1986. Pigeon navigation: solved problems and open questions. *Monit. Zool. ital. (N.S.)* 20: 471-517.
I titoli delle riviste devono essere abbreviati secondo l'ultima edizione (quarta) del World List of Scientific Periodicals (1960) e i supplementi della British Union-Catalogue of Periodicals o le Serial Publications in the British Museum (Natural History) Library. Nel dubbio scrivere il riferimento in estenso. Non includere materiale non bubblicato tra le citazioni.

Le **Tavole** devono essere numerate consecutivamente con i numeri arabi e battute su un foglio separato con una chiara ed esauriente legenda.

Illustrazioni. Il massimo del formato (legenda inclusa) è 178 × 241 mm. Le illustrazioni devono essere 1.5-2 volte più grosse del formato definitivo. Anche le figure vanno numerate con numeri arabi. Scritte, lettere e numeri delle figure devono essere sufficientemente grosse da essere lette dopo riduzione del formato. Disegni grafici in china nera devono essere fatti su carta bianca o da lucido. Assieme nell'originale vanno spedite tre copie.
Sono richieste quattro copie di fotografie.
Legende di fotografie e figure vanno scritte su foglio separato.

Cinquanta estratti di ciascun articoli sono inviati gratis. Ulteriori copie possono essere acquistate con buono d'ordine allegato alle bozze di stampa.
I manoscritti vanno spediti a:

Redazione di AVOCETTA,
Dipartimento di Biologia Animale,
via Accademia Albertina 17 - 10123 TORINO.

Instructions to authors

AVOCETTA publishes original articles, short communications, reviews surveys, comments and correspondence on all topics of ornithology. However, preference will be given to original works in the ecology, ethology and zoogeography of the ornithological fauna in the Mediterranean region and the Alpine area.
Manuscripts, conforming to the journal's scope, are subject to the review process, and the final decision concerning acceptance or rejection will be made by the Editors.
Manuscripts shoud be submitted in triplicate preferably in English (Italian and French are also accepted). They must be typewritten double spaced with wide margins. Position of figures and tables should be marked on the margin.
Manuscripts should be arranged as follows:
— Title
— Author's names and initials
— Address of author's institution
— Text of the paper, divided into the following sections: Abstract, Introduction, Methods, Results, Discussion, Acknowledgements, Abstract (in a language different from that of the text), References
— Tables and illustrations

The **abstract**, of max 40 lines, should give concise but exhaustive information on the problem and the results, and be intelligible without reference to the main text. Abstract need not repeat information given in the title.
Abbreviations and special symbols must not appear in the abstract.

The main problem should be outlined briefly in the **introduction**, and detailed historical introductions should be avoided. Continuity with earlier work on the subject should be established by reference to recent papers, which need not themselves be summarized. Experimental methods must be clearly set out, but detailed descriptions of methods are of value only if they convey substantially new information.

Genus and species names and words to be emphasized should be underlined once (for italics). The common names of animals should be capitalized.

Literature citations in the text should be given as: Mayr (1963), Andrewartha and Birch (1984), Fasola *et al.* (1987) or, at the end of a sentence, (Mayr 1963, Fasola *et al.* 1987).

References at the end of the paper should be listed in alphabetical order by the first author's name; all work referred to in the text should be listed, and only those.

References should be conformed to the following examples.

Chapter: Baldaccini N.E., Benvenuti S., Fiaschi V., Ioalé P. and Papi F. 1982. Pigeon orientation: experiments on the role of olfactory stimuli perceived during the outward journey. In: Papi F. and Wallraff H.G., Edits. Avian navigation. *Springer, Berlin* pp. 160-169.

Book : Lack D. 1954. The natural regulation of animal numbers. *Clarendon Press, Oxford.*

Journal: Papi F. 1986. Pigeon navigation: solved problems and open questions. *Monitore Zool. Ital. (N.S.)* 20: 471-517.

Titles of journals should be abbreviated according to the last (4th) edition of the World List of Scientific Periodicals (1960) and following supplementary lists issued by the British Union-Catalogue of Periodicals or the Serial Publications in the British Museum (Natural History) Library. If in doubt, give the title in full. Do not include unpublished material among the references.

Tables must be numbered consecutevely in arabic numerals and typed on a separate sheet together with a clear descriptive legend.

Illustrations. The maximum dimensions of published figures (including the legend) are 178 × 241 mm. Authors are requested to submit illustrations 1.5-2 times larger than the final format. Illustrations should be numbered in Arabic numerals.
Lettering should be big enough to remain clearly visible after reduction. Drawings should be in black ink on drafting paper. The original and three copies should be submitted.
Photographs should be submitted in quadruplicate. The legend of both figures and photographs should be typed separately from the rest of the manuscript.

Fifty (50) offprints of each paper are supplied free of charge. Additional offprints can be purchased, provided the order is received with the corrected proofs.
Manuscripts should be addressed to:
The Editors, AVOCETTA,
Dipartimento di Biologia Animale,
via Accademia Albertina 17 - 10123 TORINO, Italy.

AVOCETTA

N° 2, Vol. 16 - December 1992

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