

NUMBERS, BEHAVIOUR AND ORIGIN OF MEDITERRANEAN GULLS *LARUS MELANOCEPHALUS* WINTERING ALONG THE WEST COAST OF SOUTHERN PORTUGAL

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SUMMARY - Several thousands of Mediterranean Gulls *Larus melanocephalus* were observed in the winters of 2004/2005 and 2005/2006 at two sites of the West coast of Southern Portugal. Along the Lisbon coast (Guincho-Cascais-Estoril-Paredes, west of Lisbon) a maximum of 6,000 birds was observed and along the Alentejo coast at least 1,000 birds were present in the Mira river mouth, near Vila Nova de Milfontes. With an unknown, but probably considerable number of birds wintering along the Algarve coast, the total number of birds wintering in Portugal south of Cabo da Roca is estimated at a minimum of 7,000-8,000 birds. This estimate is six times higher than the previous estimate in the nineties of 1,200 wintering birds. This increase is likely explained by the increase of the breeding population in Western and Central Europe. Behavioural observations suggest that along the Lisbon coast the birds mainly feed offshore. A substantial proportion of the birds (up to 4,000 birds) fed on the outflow of an offshore sewage exit west of Cascais, but birds also foraged on natural prey (along front lines). Whether fishery discards is an important food source far offshore, like it is in the Mediterranean, is unknown. Sightings of colour ringed birds indicate that birds came from Belgium, the Netherlands and France with a small proportion coming from other countries (ranging from North-western Europe to as far east as the Ukraine). A low re-sighting rate of individual colour ringed birds suggests that a very high number of ringed birds wintering in Portugal remained unnoticed so far. While the total number of Mediterranean Gulls demonstrates that the Portuguese coast south of Cabo da Roca is the most important known wintering site along the European and North-African Atlantic coast, the first data gathered from colour ring readings highlight the importance of this area as a wintering ground for the Mediterranean Gulls that breed in North-western Europe.

ABUNDÂNCIA, COMPORTAMENTO E ORIGEM DAS GAIVOTAS-DE-CABEÇA-PRETA *LARUS MELANOCEPHALUS* QUE INVERNAM AO LONGO DA COSTA OCIDENTAL NO SUL DE PORTUGAL - Foram observados milhares de indivíduos de Gaivota-de-cabeça-preta *Larus melanocephalus* nos Invernos de 2004/2005 e 2005/2006 em dois locais da costa ocidental do sul de Portugal. Na costa ocidental de Lisboa, situada entre o Guincho e a Paredes, foram registados um máximo de 6000 indivíduos e pelo menos 1000 indivíduos foram detectados na foz do Rio Mira, perto de Vila Nova de Milfontes. Considerando que existe uma grande probabilidade de um elevado número de aves desta espécie invernaem ao longo da costa Algarvia, a estimativa mínima de Gaivotas-de-cabeça-preta invernaentes em Portugal, a sul do Cabo da Roca, é de 7000 a 8000 aves. Esta estimativa é 6 vezes superior à estimativa anterior de cerca de 1200 aves invernaentes. Este aumento está provavelmente relacionado com um aumento de população nidificante na Europa Central e Ocidental. Foram igualmente efectuadas observações comportamentais que sugerem que ao longo da costa de Lisboa as Gaivotas-de-cabeça-preta se alimentam preferencialmente em mar alto. A maior parte destas aves (até um máximo de 4000

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indivíduos) alimentou-se à saída do emissário submarino da Guia, localizado a oeste de Cascais, uma proporção elevada alimentou-se de presas naturais ao longo da praia. Ficou por avaliar a importância das descargas dos barcos de pesca na dieta deste espécie na área de estudo. As recapturas visuais indicam que a maior parte das aves é originária da Bélgica, da Holanda e da França, e apenas uma pequena proporção vem de países como a Alemanha, a Hungria, a Sérvia, a Polónia, a Itália, o Reino Unido e a Ucrânia. A baixa taxa de recaptura dos mesmos indivíduos sugere que muitas das aves anilhadas não são detectadas. Resumindo, o elevado número de Gaivotas-de-cabeça-preta detectadas na Costa Portuguesa a sul do Cabo da Roca sugere que esta zona é a área de invernada mais importante na costa Atlântica da Europa e de África, e as recapturas visuais indicam que estas são aves provenientes das áreas de nidificação do Noroeste da Europa.

Since a long time the main breeding ground of the Mediterranean Gull *Larus melanocephalus* is on the North-western coast of the Black Sea (Ukraine), with several other important colonies in Turkey, Greece and Italy (Burger & Gochfeld 1996, Snow & Perrins 1998). In the 50's-70's the species showed a spectacular colonisation of Central and North-western Europe, progressively from the east to the west and shows an ongoing increase since then (Meininger & Bekhuis 1990, Hoogendoorn *et al.* 1999, Cadiou *et al.* 2004, Bijlsma *et al.* 2004). The current population estimates for North-western Europe (Ireland, United Kingdom, NW-France, Belgium, The Netherlands, Germany, Denmark), Central Europe (Switzerland, Austria, Czech Republic, Poland, Slovakia, Hungary, Serbia, Romania, and Bulgaria) and Mediterranean Europe (Spain, SE-France, Italy, Greece and Turkey) are respectively around 4,100, 800 and 11,000 breeding pairs (BirdLife International 2005, Cadiou *et al.* 2004, van Dijk *et al.* 2006, Mitchell *et al.* 2004). The estimates of the eastern population for the Ukraine, including also Russia (and minor numbers in Azerbaijan) are larger and range from several 10,000s up to 300,000 (Mitchell *et al.* 2004, BirdLife International 2005), but there are doubts over whether the size of this part of the breeding population is as large as indicated by the upper limit of these estimates (Wetlands International 2006).

The winter distribution of Mediterranean Gulls along the Atlantic coasts of Western Europe and North-west Africa, and along the Mediterranean coast is being studied by various independent but closely related/coordinated colour ringing programmes. These studies have indicated that most birds originating from the Black and Mediterranean Sea winter along the Mediterranean coast of Spain,

Tunisia, and Morocco (Baccetti & Smart 1999, Burger & Gochfeld 1996, Shevareva 1955, Snow & Perrins 1998), with some birds crossing the European continent and reaching the Atlantic coast of Europe (Shevareva 1955, Flamant *et al.* 2003, Flamant *et al.*, in prep.). The Mediterranean Gulls from the North-western European colonies, and to a lesser extent, from the Central European colonies, are mainly wintering along the Atlantic coast (Meininger *et al.* 1999, Varga *et al.* 1998).

Observations on numbers, and ringing data have shown that considerable numbers pass by the French Atlantic coast with a peak in July-September. In winter most birds disappear, probably to more southern wintering quarters (such as Portugal) (Hoogendoorn *et al.* 1999). Since the eighties and nineties the coast of Southern Portugal is known as a wintering area for Mediterranean Gulls with an estimated minimum total of 1,200 birds between the Lisbon coast and Faro in winter 1989/1990 (Moore 1992 & 1998, Paterson 1997). A study in December 2001 revealed that several hundreds of Mediterranean Gulls foraged far off shore along the west coast of Cascais (Poot 2003).

In this paper observations on numbers and behaviour of Mediterranean Gulls wintering along parts of the West coast of Southern Portugal are presented for the winters 2004/2005 and 2005/2006. In this period, special efforts were also made to read colour ringed birds at a few sites, hereby giving the first indications on the origin of the birds appearing in winter in Portugal.

METHODS

During the winters of 2004/2005 and 2005/2006, systematic counts and behavioural observations of

Mediterranean Gulls were made along the Lisbon coast, central Portugal. These observations took into account birds that were resting along the coast, either on the water or on land, and birds flying at sea (either directed movements or foraging birds).

All counts and behavioural observations were made between December 24 and March 19. In 2004/2005 a stretch from 15 km between Guincho and Estoril was counted, in 2005/2006, observations were mainly carried out in the area between Cascais and Estoril. All observations were taken by scanning the sea in a systematic way: with 10x binoculars and by a 20x or 32x telescope amplification. In this way most of the coastal zone up to approximately 3-4 km from the shore was observed. The stretches of coast were observed in a relatively short time during every visit to minimize double counts. A general distinction in behaviour was made between birds rafting at sea and birds in search flight/foraging.

In both winters efforts were also made to read colour rings along the coast of Estoril-Parede, the only area along the Lisbon coast where considerable numbers of birds regularly come to land. Furthermore, in November 2005 the colour ring reading activity was expanded in order to also include other important wintering areas in Portugal. Besides birds at the Estoril coast, birds near Vila Nova de Milfontes at the Alentejo coast were checked for rings as well. Additionally, observations in the period 1993-April 2006 are presented on numbers and colour ringed Mediterranean gulls made by other ornithologists, mainly involved in colour ringing programmes of large gulls (H. Verduyn, P. Rock, S. Keinath, A. Deutsch, R. Matias, S. Algera, C. Moore).

RESULTS

Numbers and behaviour along the Lisbon coast

Along the Lisbon coast there were three areas where Mediterranean Gulls occurred: Guincho bay-Cabo Raso, the West coast of Cascais and the Estoril coast (Table 1). In the evening of 24 December 2004 a remarkable concentration of several thousands of Mediterranean Gulls was discovered, feeding offshore about 2 kilometres west of Cascais. This concentration was observed on several following days on exactly the same spot near four large yellow buoys. The total number present here fluctuated between

several hundreds up to several thousands (Table 1). During some visits the total number of birds present could not be determined due to high waves and only a minimum number of birds could be estimated. In the winter of 2005/2006 on four observation days at exactly the same spot again a large concentration of Mediterranean Gulls was present. The four yellow buoys indicate the spot of an offshore exit of a sewage pipe, discharging waste water of a large area west of Lisbon (Figure 1), apparently an interesting foraging spot for Mediterranean Gulls, but also for large numbers of Lesser Black-backed Gulls *Larus fuscus*. It was observed a few times that almost the complete flock of several thousands of birds flew up and appeared above the waves, because of the appearance of a Parasitic Skua *Stercorarius parasiticus* which in all cases kleptoparasitized specifically on Mediterranean Gulls cf. Arcos (2000). On 2 January 2005 regularly intense flight movements occurred between the large foraging flock in the sewage exit area and the rocky coast of Boca do Inferno-Farol da Guia where a large number of birds was resting on the water.

Further to the east along the Estoril-Parede coast birds flying from the sea also regularly came to rest and preen on the water or on the rocks when these became available during low tide. The birds made use of freshwater streams to drink and bath. Along the coast near Estoril the gulls also fed on sea anemones (e.g. early morning low tide on 15 November 2005: 43 birds at Praia de Tamariz; 69 birds at Praia de São Pedro), but the numbers here were heavily influenced by human disturbance (tourists, fishermen, dogs). One of the relatively quietest places for the gulls were the low lying rocky shores of Praia da Parede, but also here the birds were often disturbed and rested most of the time on the water.

In the evening of 30 December 2005 a large roost occurred on the water in the bay of Estoril-Parede, with a total number of at least 1,200 birds. During the day up to 674 birds at maximum were present in this area (Table 1). Most birds were flying in from the east, probably coming from the coastal strip further to the east along the Tejo mouth (or even further from the Tejo estuary).

In the afternoon of 31 December 2004 1,040 birds were resting on the water of Cabo Raso-Guincho bay. This was during a relatively calm day. Comparable numbers were found on 22 January 2006,

Table 1. Number of Mediterranean Gulls along the Lisbon coast in winter 2004/2005 and 2005/2006, with a distinction between four sub areas. The birds observed offshore were foraging around an underwater sewage exit just west of Cascais, approximately 2 km out of the coast. Numbers indicated with > imply minimum numbers due to heavy seastate conditions at sea, with a large proportion of the flock not visible between the waves. – = no observations made. / **Tabela 1.** Número de Gaivotas-de-cabeça-preta ao longo da costa de Lisboa durante o Inverno 2004/2005 e 2005/2006. A área está dividida em 4 seções diferentes. As aves alimentaram-se à saída do emissário submarino da Guia, localizado no mar a 2 km oeste de Cascais. Devido a dificuldades de observação impostas pela elevada ondulação frequente na área de estudo muitas dos números apresentados são estimativas mínimas (>). - = não foram efetuadas observações.

Date	Start	End	Guincho-Cabo Raso	Offshore sewage exit, west of Cascais	Farol da Guia-Boca do Inferno, coast Cascais	Estoril-Parede	Total
24-12-04	17:10	17:50	-	2,500	70	-	2,570
26-12-04	09:54	12:34	2	>500	130	424	>1,056
31-12-04	10:35	13:34	1,040	>500	271	239	>2,050
02-01-05	13:42	16:36	150	4,000	1,170	674	5,994
19-03-05	17:45	18:00	-	80	0	-	80
29-12-05	10:30	13:00	40	2,100	246	601	2,987
30-12-05	09:45	11:30	0	150	450	-	600
21-01-06	17:30	18:10	-	3,000	0	45	3,045
22-01-06	11:40	13:15	1,240	>800	0	250	>2,290

again under calm weather conditions, but then also several hundreds of birds were foraging (surface sizing and dipping) along a tidally induced front line related to the coast line of Cabo Raso. The gulls were joined by several tens of shallow plunge diving and surface sizing Balearic Shearwaters *Puffinus mauretanicus*.

Numbers and behaviour along Vila Nova de Milfontes coast

In November 2004, hundreds to 1,000 Mediterranean Gulls were recorded at sunset on a rock at the Mira river mouth (pers. com. H. Vercrujse). On 11 November 2005, 456 birds were resting on a sand flat in the Mira at 17h15. The birds were roosting here and at 18h00 at sunset an estimated 1,000 birds were present. On 12 November 2005, 678 birds were present here at 17:35h with another 100-200 birds joining to roost, again arriving at an estimated 1,000 birds total. On both days, several hundreds of Mediterranean Gulls roosted upstream

on the river Mira near a fish farm. At falling tide, Mediterranean Gulls started appearing on the beaches and the rocks of the river mouth, on the sand flat in the middle of the river or on the left bank, coming mainly from the sea, where they drank and bathed on freshwater flowing into the Mira from the left bank.

Observations of colour ringed birds

Although the area between Guincho and Cascais held the largest numbers of Mediterranean gulls in the Cascais region, it was not possible to read colour rings in this area because the majority of the birds rested on the water. However, in Estoril and further east birds came regularly to rest on the rocky shores and beaches, such as Praia do Tamariz, Praia de São Pedro, Praia de Carcavelos, Praia da Torre, Praia de Santo Amaro de Oeiras and especially Praia de Parede. These areas provided the best ring reading opportunities depending on the moment of low tide and in the absence of human disturbance.

Near Vila Nova de Milfontes colour ringed

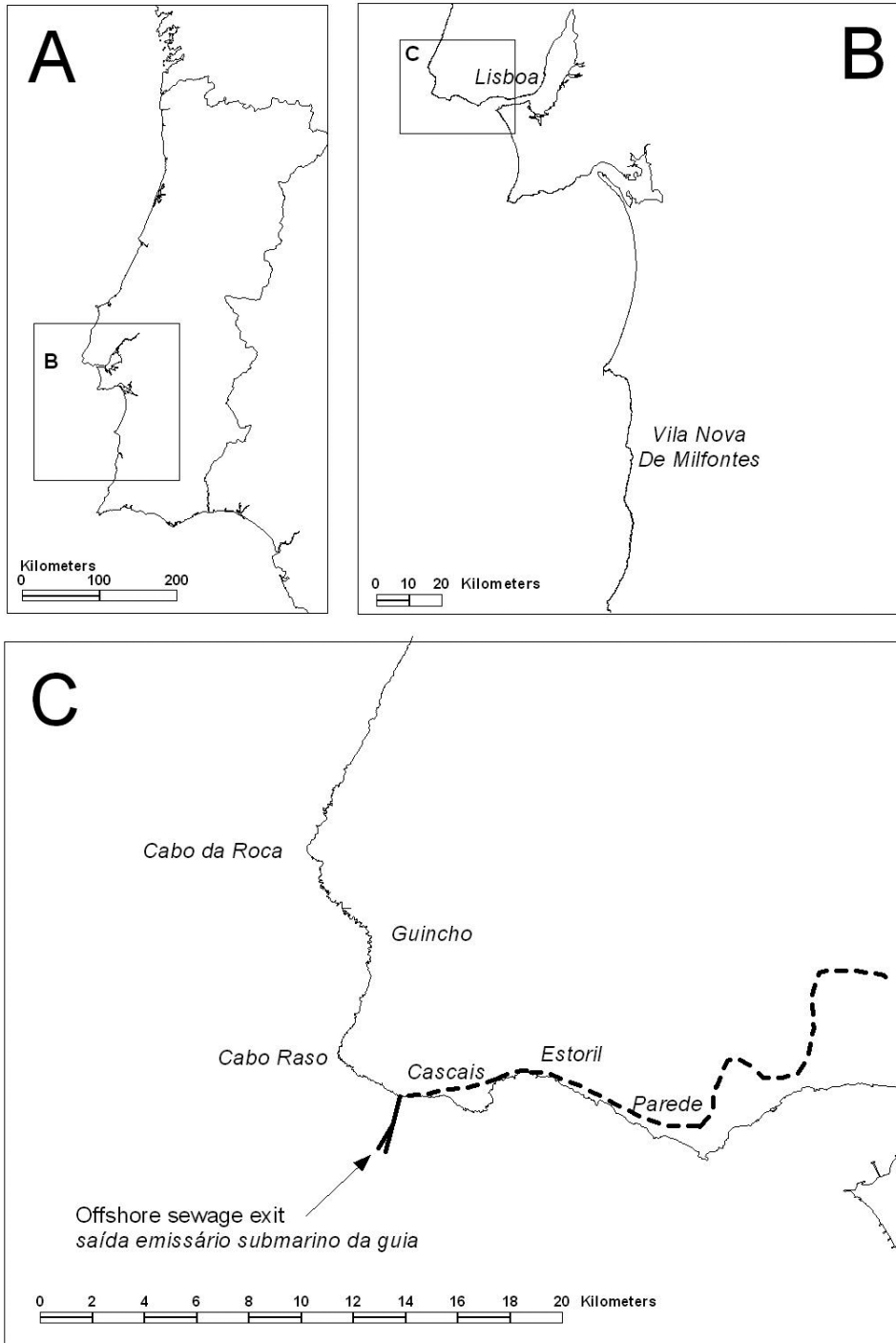


Figure 1. Most important study sites and places mentioned in the text. Indicated is the offshore sewage exit west of Cascais (source: Sanest, Paço de Arcos), where large numbers of Mediterranean Gulls were observed foraging at sea. / **Figura 1.** Descrição da área de estudo. Está indicada a saída do emissário submarino da guia, localizado a oeste de Cascais onde uma elevada proporção de Gaiotas-de-cabeça-preta se estavam a alimentar (fonte: Sanest, Paço de Arcos).

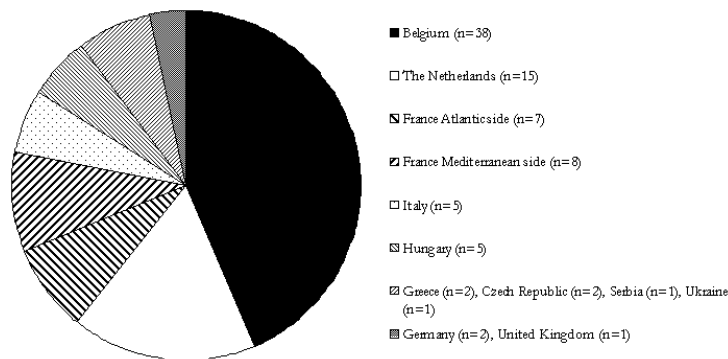


Figure 2. Origin of the 87 birds ringed at the breeding colony as chicks and sighted in Portugal in the period 1993-April 2006. / **Figura 2.** Origem de 87 aves anilhadas enquanto crias e observadas em Portugal.

Mediterranean Gulls were spotted at three places: the beach and rocks at the river mouth, the sand flats in the middle of the river and on the left bank of the river. The ring reading conditions were less good than on the beaches of Estoril due to the large observation distance. On 11 and 12 November 2005 a total of 184 birds could be checked on rings (4.9% were colour-ringed, 3.8% carried a metal ring only).

Until April 2006, a total of 135 sightings concerning 110 individual colour ringed Mediterranean Gulls has been reported in Portugal, mainly during the winter (92% of the observations); 9% of these sightings were made in the Douro region, 61% in Estremadura (of which 88% along the Lisbon coast or in the Tejo estuary), 15% in coastal Baixo Alentejo, 1% inland Alentejo (Évora), 10% in Algarve, and 4% in the Azores.

The vast majority of the Mediterranean gulls sightings corresponded to birds that were ringed as chicks in North-western European countries (87 out of 110 different individuals); 44% in Belgium, 17% in the Netherlands and 8% in 'Atlantic' France. The rest of the sighted birds were born outside North-western Europe: 8 birds from the Mediterranean side of France, 5 birds from Hungary, 2 from the Czech Republic, 1 from Serbia and 1 from the Ukraine (Figure 2). The remaining 22 Mediterranean Gulls sighted in Portugal corresponded to birds not ringed as a chick; Belgium 11, the Netherlands 4, France 4, Czech Republic 1, Hungary 1 and Poland 1.

59% of the sightings were made in the winter season 2005-2006 by six observers. 1.5% of the birds were sighted in 2 different winters within Portugal,

while 98.5% were observed in only one winter period.

DISCUSSION

Total numbers wintering along the Portuguese coast

The west coast of Southern Portugal is known as a major wintering area for Mediterranean Gulls (Moore 1992 & 1998, Paterson 1997), and seasonal counts at the Cascais-Lisbon coast between 1987-1991 revealed that highest numbers occur during December-February (Moore 1992).

In Portugal the main concentration areas for the Mediterranean Gull are reported to be: (1) the Lisbon area (Tejo estuary, Estoril, Cascais and Guincho), (2) the Alentejo coast and (3) the Algarve coast (Moore 1992 & 1998, Paterson 1997). In the Alentejo coast, the river mouth of the Mira near Vila Nova de Milfontes seemed to be a major concentration area for the species (Moore 1998). Later observations confirmed this area as an important refuge site; on 20 December 2000, a minimum of 500 birds were reported (A. Deutsch, pers. com.) and on 23 December 2001 a total of 320 birds was present (Poot 2003). Besides Vila Nova de Milfontes, also Porto Covo and Estuário do Sado were known wintering sites for Mediterranean Gulls in Alentejo, with at least several tens of birds occurring on each site (Moore 1998). From the Algarve coast less information was known; at least up to 600 birds were wintering there in the late eighties (obs. R. Rufino in Moore 1998). Based on all these observations it was estimated that in

Portugal at least 1,200 Mediterranean gulls wintered between Cabo da Roca (north of Cascais) and the Algarve in the period of 1989-1990 (Moore 1998).

Our results, based on counts made in the winters of 2004/2005 and 2005/2006 along the West coast of South Portugal point to an increase in the number of Mediterranean gulls wintering in Portugal. Up to 6,000 birds use the Lisbon coast alone and around 1,000 use the Mira river mouth at Vila Nova de Milfontes. If we incorporate a minimum estimated number of 1,000 birds wintering in the Algarve coast (in December 1998 1,100 resting birds were observed in the area of Ria Formosa near Faro; obs. P. Rock in Poot 2003), we arrive at an minimum winter population of 7,000-8,000 birds, that is 6 to 7 times more wintering birds than were observed in the early nineties.

We think that the reported increase in numbers of wintering birds in Portugal at least for a large part is related with the ongoing increase in the North-western European breeding population. This assumption is supported by the relatively high recovery of ringed birds born in North-western European colonies. In the Netherlands, Belgium and France a more than 10 times increase occurred of the number of breeding pairs between 1990 and 2000. In 1989-1990 the total breeding population of the Netherlands, Belgium and France together amounted less than 300 breeding pairs, while in 2000 a total of about 3,500 breeding pairs occurred in these three countries together (of which 1,800 breeding pairs in the Camargue, at the Mediterranean side of France) (Bijlsma *et al.* 2001, Cadiou *et al.* 2004, van Dijk *et al.* 2006).

Overall, it is likely that the Portuguese coast south of Cabo da Roca is the most important wintering area along the whole Atlantic coast. Along the French Atlantic coast several thousands of birds winter (4,600 birds counted in winter 2004-2005, Dubois & Jiguet 2006), indicating an ongoing increase in numbers since 1984 (Dubois *et al.* 2000). As important sites were not covered, it is likely that the actual number along the French Atlantic coast probably lies around 5,500-6,000 birds (own estimate). Along the Atlantic coast of Spain, Great Britain and Ireland the numbers are known to be lower, with several hundreds of birds at maximum in each area, with the same holding for the Atlantic coasts of Morocco, Western Sahara and Mauritania (Snow & Perrins 1998).

Offshore foraging and possible food sources

Up to now the knowledge about the foraging behaviour of the Mediterranean Gulls in winter in Portugal was restricted to observations close to the coast, in estuaries and salt pans (Farinha & Costa 1999). However, recent observations along the Lisbon coast, suggest that this species may also adopt a strong offshore feeding behaviour. In this area, in December 2001, Mediterranean gulls have been observed flying far from the sea in the morning, a behaviour that was interpreted as return from a feeding trip (Poot 2003). The complete absence of birds on the coast in the early morning suggested that the birds spent the night out at sea. Based on the timing of the flight movements relative to the moment of sunrise, it was calculated that along the Lisbon coast the Mediterranean Gulls could have foraged on the whole continental shelf near Cabo Raso, up to 30-80 km away from the coastline (Poot 2003). This offshore feeding behaviour may be profitable if food becomes more accessible at certain periods in the day, such as the daily vertical migrations of many species of fish, crustaceans and squid, which occur at sunset and at dawn (Blaxter & Hunter 1982).

Furthermore, for this species discards of commercial fisheries could also play an important role generating profitable foraging conditions, as the Mediterranean Gull is known to assume opportunistic habits. Particularly in the Mediterranean Sea the species at sea profits from fishery discards (Arcos & Oro 2002), where the offshore distribution of the species commonly reach up to 25 km out of the coast (Arcos 2005). The offshore studies so far carried out in the Portuguese coastal waters have not yielded any indications as such, although these surveys were not carried out in the main wintering period (SPEA LIFE marine IBA project in progress). However, opportunistic feeding behaviour related with human induced food resources also occur nearby the coast, as many gulls were observed feeding close to the Cascais offshore sewage exit. It is unknown what type of food the gulls were preying upon, as the area is too far to be able to identify the prey items from the shore, and only a boat visit will give a clarification of this matter.

The observations on the feeding behaviour of the Mediterranean Gull along the Lisbon coast, clearly indicate that these birds may adopt several feeding patterns, either they can feed on natural food sources

offshore and along the coast, probably at times where profitable food items become available, or they can profit from human generated food items, such as the Cascais sewage exit. The relative contribution of these types of feeding behaviour remains to be studied in the Portuguese coast. Furthermore, it will be interesting to see if depending on the environmental conditions the same individuals may assume different feeding strategies, or if birds are specialised in a single type of foraging behaviour. A better follow up of the observations on colour-ringed individuals may help to shed some light to this question.

Origin of the Portuguese wintering population

Based on the sightings of colour ringed birds so far, it can be stated that the Portuguese coast is hosting Mediterranean Gulls originating from nearly the whole breeding range, including the recent North-western and Central European colonies at one hand, and the Black Sea and the Mediterranean Sea colonies on the other. As the ringing effort is very different in the many colonies across the whole breeding range, in principle no strong conclusions can be drawn from Figure 2 about the proportions of wintering birds from each country. However, with 53% of the birds born in Belgium or the Netherlands and sighted in Portugal, it is most probable that an undetermined but fairly representative proportion of Mediterranean Gulls from the 'Low Countries' is wintering in Portugal. A good follow-up of observations on wintering flocks in the Lisbon area and Alentejo coast should refine the presented results. The discovery of important roosting places in the Algarve with good ring-reading conditions would complete the picture.

The re-sighting rate of individual colour ringed birds over several winters is very low (1.5%). This low rate is probably more related with the low ring-reading effort in Portugal than with an improbable short stay along the Portuguese coast, since none of the birds observed in Portugal have been reported wintering in another area. Moreover, in areas elsewhere in Europe where the ring-reading activity is high, a high wintering site fidelity was found.

A better follow-up of observations on colour ringed birds would enable us to demonstrate whether the birds wintering in Portugal consist of the high number of North-western European, particularly Belgian and Dutch Mediterranean Gulls with an

unknown wintering site so far, disappearing on the rest of the Atlantic coast of North-western Europe from October onwards (Meininger *et al.* 1999). Based on both the increased number of birds and the ring sightings there is a strong indication that the Portuguese coast south of Cabo da Roca is one of the very important wintering sites for the North-western European breeding colonies. However, it is clear that more observations are necessary to refine this hypothesis and to answer the question how important the Portuguese coast is for birds from Central-European, Mediterranean Sea and Black Sea colonies.

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