

POPULATION STATUS AND DIET OF YELLOW-LEGGED GULL IN THE AZORES

During the last decades the Yellow-legged Gull *Larus michahellis* has increased in numbers throughout the western range of its distribution (Snow & Perrins 1998). In the Mediterranean, the increase has also been noticeable over the past few decades (Vidal *et al.* 1998), mostly owing to the availability of abundant and predictable food sources from rubbish dumps and from commercial fisheries discards (Arcos *et al.* 2001; Oro *et al.* 1995).

In the Azores, subtropical north-eastern Atlantic, Yellow-legged Gulls have no direct competitors and their numbers are also thought to be increasing in the archipelago (mainly due to refuse availability), raising conservation concerns such as possible displacement of Roseate Tern *Sterna dougallii* colonies and depredation of tern chicks as well as other seabird chicks and adults. Available data on gull numbers in the Azores are restricted to a census carried out in 1984, when 2705 breeding pairs were counted at 27 colonies (Dunn *et al.* 1989). Recently gulls have been observed establishing at two of the main Roseate Tern colonies in the Azores: Ilhéu das Contendas, Terceira island and Ilhéu da Vila, Santa Maria island (V. Neves, personal observation), and on Ilhéu da Vila gulls have been observed taking tern chicks (J. M. Soares personal communication).

This study examines changes in distribution and numbers of Yellow-legged Gulls in the Azores archipelago in the last 20 years. Data on gull diet were also collected on six of the nine islands of the archipelago.

Survey

The census yielded an estimate of 4249 pairs of Yellow-legged Gulls, which represents an increase of almost 60% since the previous survey conducted in 1984. On the French Mediterranean coast, numbers annually increased by 6.9-7.8% between 1966 and 76 (Snow & Perrins 1998), and by 13% on the Balearic Islands, Spain, during the 1983-1987 period (Rodríguez 1999). Recently in La Palma, Canary Islands, Ramos (2003) found an increase of 229% during the 1987-2002 period.. The western Mediterranean population of Yellow-legged Gulls is currently estimated to be increasing at a rate comprised between 7 and 10% per year (Thibault *et al.* 1996) while the Azorean population is increasing at an average annual rate of only 2.3%, as deduced from the 1984 and 2004 estimates.

Gulls are also spreading their distribution in the archipelago; eight new breeding sites were discovered but in total they comprised less than 4% of the population. All the colonies monitored but one (Lagoa do Fogo inland crater) were coastal. The main concentrations of gulls

were found on São Jorge (980 pairs), Terceira (904 pairs), and São Miguel (820 pairs). The growth of the breeding population resulted mainly from the increase in previously existing colonies, especially at Ilhéu do Topo, Mistério da Prainha and Ilhéus das Cabras.

Gulls were also detected on a total of 14 islets and sea stacks, which accounted for more than 55% of the breeding population. Apart from Ilhéu da Vila which has been a traditional large colony for Roseate and Common Terns, most of these islets occupied by gulls had small numbers of breeding terns (e.g., Ilhéu das Cabras –W: 50 pairs of Common Terns, Ilhéu do Topo: 37 pairs of Common Terns, Ilhéu de Baixo: 3 pairs of Common Terns), suggesting that the presence of gulls on these islets is probably limiting the distribution of terns in the archipelago.

Diet - pellets

A total of 1950 pellets were collected in six colonies of the Azores. A single pellet contained up to 5 types of prey, with only a few pellets being a discrete prey type (mostly fish, goose barnacle or bird). Fish was not very abundant in the samples and contributed to a maximum frequency of occurrence of 37.1% (during chick-rearing at Graciosa); nevertheless the fish prey was highly diverse with a total of 35 different species identified through otoliths and vertebrae.

Diet - Regurgitates

46 regurgitates, seven from adults and 39 from chicks were collected at Faial colony. The food regurgitated by adults included rice, mushrooms, corn, meat, bones (possibly chicken) and earthworms. Chick regurgitates included mainly fish (43.8%), meat (25.6%) and earthworms (10.3%); the remaining 20% being made up by molluscs, goose barnacles, vegetable matter and unidentified items.

Discussion

Gulls have no direct competitors in the Azores and probably benefit from recent development of fisheries and increases in rubbish dumps. The foraging range of the Herring Gull, similar in size and feeding habits to the Yellow-legged Gull, has been estimated to be 40 km (Witt *et al.* 1981). Most of the largest gull colonies in the Azores have refuse sites well within this distance and it is therefore not surprising that pellets collected in several colonies indicate that in some colonies the birds are largely dependent on rubbish dumps to feed. This conclusion is supported by the large numbers of individuals, both adults and immatures, observed feeding at the rubbish dumps of the main islands, Terceira and São Miguel. In 1998, 88% of the rubbish produced in the archipelago was disposed on rubbish dumps and only 12% was going to controlled landfills (Anonymous 2001). The situation has changed since then but in some islands is still precarious.

We visited rubbish dumps and landfills on São Miguel, Terceira, Faial, Graciosa and Flores and found considerable numbers of gulls feeding on all of them except on Graciosa, where the rubbish is regularly covered and only one gull was observed.

Bosh *et al.* (1994) reported that more than 60% of food ingested by Yellow-legged Gull in the Medes Islands was garbage. In the Azores, these values varied significantly among islands and were only surpassed in São Miguel and Terceira Islands, with 91.9% and 96.8% respectively, essentially containing chicken (91.4% and 76.7% for São Miguel and Terceira, respectively). Similar results have been reported by Annett & Pierotti (1989) who found that the major food types of Western Gulls *Larus occidentalis* were garbage from which > 90% was chicken. Previous diet studies of the Yellow-legged Gull in the Azores (Hamer *et al.* 1994; Ramos *et al.* 1998) did not find refuse in the pellets in Mistério da Prainha (Pico) and Ilhéu do Topo (São Jorge); however in the present study these values were 30.25 and 13.1% respectively.

The presence of meso and benthopelagic fish species in Yellow-legged Gull pellets has been reported in previous studies conducted in the archipelago (Hamer *et al.* 1994; Ramos *et al.* 1998). Hudson & Furness (1988) postulated that these species may be made available to surface predators as discards from fisheries. The present study has once more found the presence of deep-water fish species. Even if some species might become available through fishery activity the presence of several species from the Myctophidae family is harder to explain. This family was represented by 79 otoliths of 10 different species, the most abundant being *Electrona rissoi*, a species that also occurs in other seabird species diets in the Azores (terns – Granadeiro *et al.* 2002; Cory's Shearwater *Calonectris diomedea*, Bulwer's Petrel *Bulweria bulwerii* and Madeiran Storm Petrel *Oceanodroma castro* – V. Neves unpublished data). 31% of the 35 different fish species present in the gull pellets have commercial interest. Fishery waste represents an important food resource for the gulls from the British Isles (Furness *et al.* 1992), but in the Azores discards and offal are rare. However sometimes fishermen will carve some of the fish caught and use it as bait. In this way some fishes might become available to the birds, as in the case of the Berycidae family. The low frequency of occurrence of these species corroborates the possibility that they are consumed by gulls only when made available by fishermen.

Gulls are expanding in the archipelago and it is important to monitor numbers and distribution during the forthcoming years. The progressive replacement of rubbish dumps by landfills following new environmental policies will reduce an important source of food for the gulls and might result in a larger predatory pressure on other seabirds, such as the Roseate Tern. It is of new colonies, it is important to act in this early stage of colonization when control measures are not so onerous and ensure higher probabilities of success.

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