

## Conservation programme for Audouin's Gull in the Chafarinas Islands

GEORGINA ALVAREZ

National Institute for Nature Conservation, Gran Vía de San Francisco 4 - 28005 Madrid, Spain

**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*, *Mesembrianthemum* 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

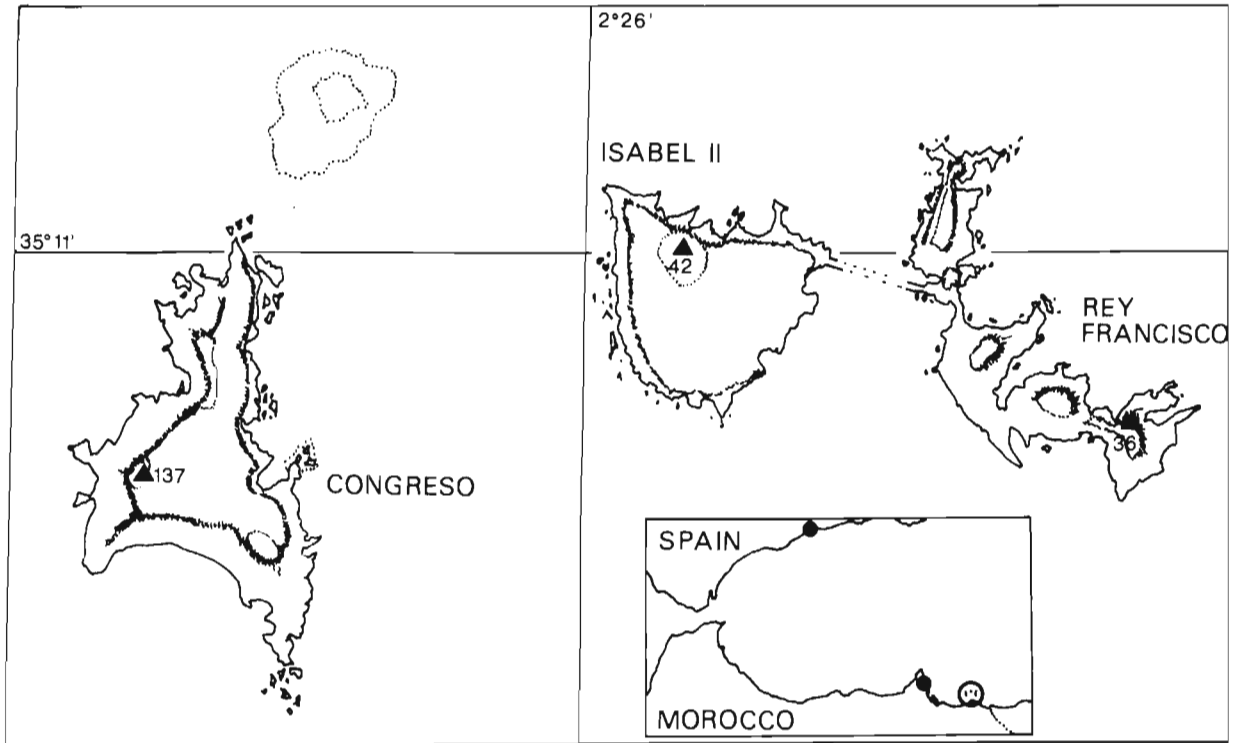


Figure 1. Study area, Islas Chafarinas.

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 hypothetical 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

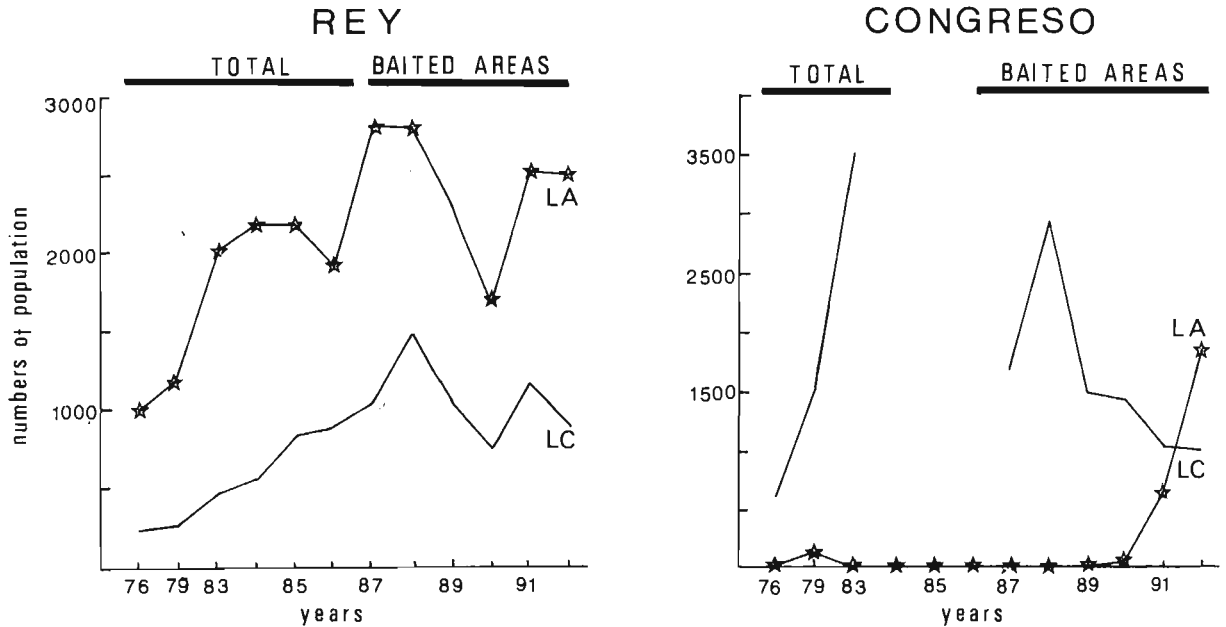


Figure 2. Year-to-year changes of the Audouin's (LA) and Yellow-legged (LC) Gull population on Rey and Congreso Islands. Total numbers were reported by Varela and De Juana 1986, and Bradley 1988. Since 1987, data are counts of nests on baited areas (accessible sites) obtained by this study.

(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

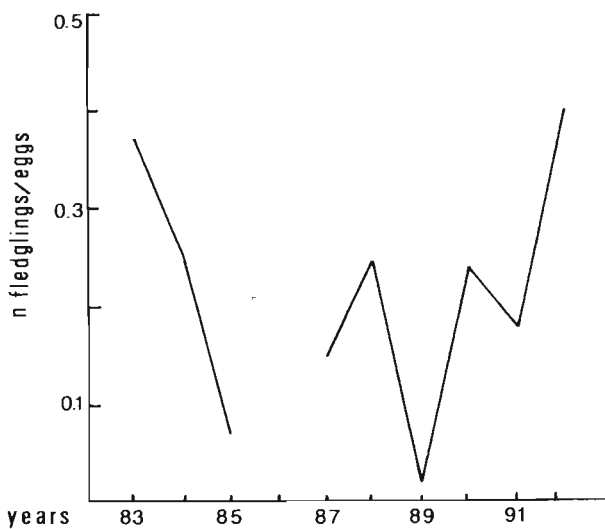


Figure 3. Changes in Audouin's Gull breeding success on Rey Island.

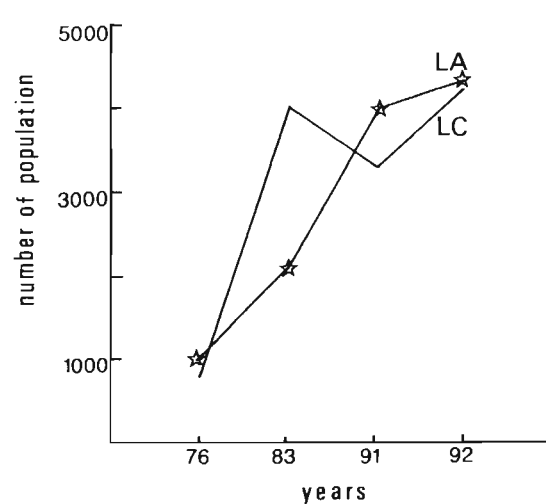


Figure 4. Changes in the total Audouin's (LA) and Yellow-legged (LC) Gull populations on Rey and Congreso Islands (accessible sites and cliffs).

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.

## References

- Birkhead F. R. and Furness R. W. 1985. Regulation of seabird populations. In: Sibly R. M. and Smith R.H. *Behavioural Ecology. Ecological consequences of Adaptive Behaviour*. Blackwell Scientific Publications.
- Bradley P. 1986. The breeding biology and conservation of Audouin's Gull *Larus audouinii* on the Chafarinas Islands. *Thesis, Glasgow University*.
- Bradley P. 1986. The breeding biology of Audouin's Gull on the Chafarinas Islands. In: Medmaravis and X. Monbailliu (Eds). *Mediterranean Marine Avifauna - Population Studies and Conservation*. NATO ASI Series, Vol. 12: 221-230. Springer Verlag, Berlin Heidelberg.
- Brosset A. and Olier A. 1966. Les Iles Chafarines lieu de reproduction d'une importante colonie de Goélands d'Audouin (*Larus audouinii*). *Alauda* 34: 187-189.
- De Juana E., Varela J. and Witt, H.H. 1984. The conservation of seabirds at the Chafarinas Islands. *International Council Bird Preservation, Technical Publication* 2: 363-369.
- Mayol J. and Muntaner J. 1985. Censo de la población de Gaviota Argéntea (*Larus argentatus*) y de la Gaviota de Audouin (*Larus audouinii*) en 1983 y algunas consideraciones. *Asturnatura* 4: 25-32.
- Monbailliu X. and Torre A. 1986. Nest-site selection and interaction of yellow-legged and Audouin's Gulls at Isola del l'Asinara. Pp 245-263. In: Medmaravis & X. Monbailliu (Eds.). *Mediterranean Marine Avifauna*. NATO ASI, Series 12. Springer-Verlag, Berlin Heidelberg.
- Telleria J.L. 1986. Manual para el censo de los vertebrados terrestres. *Ed. Raices*, Madrid.
- Thomas G.J. 1972. A Review of Gull Damage and Management Methods at Nature Reserves. *Biol. Cons.* 4: 117-127.
- Troya A., Martínez Vilalta A., Mayol J. and Gómez J.A. (in press). Actual state and preliminary results of the Coordinated Action Plan for the conservation of Audouin's Gull in Spain. *Proc. 2° Medmaravis Conference*, Calvià, 1989.
- Varela J.M. and De Juana E. 1986. The *Larus cachinnans michahellis* colony of Chafarinas Islands. pp: 231-244. In: Medmaravis & X. Monbailliu (Eds.). *Mediterranean Marine Avifauna*. NATO ASI, Series 12. Springer-Verlag, Berlin Heidelberg.