

POPULATION OF THE SILVER GULL *Larus novaehollandiae* ON THE CAPRICORN AND BUNKER ISLANDS, GREAT BARRIER REEF

T. A. WALKER

Queensland National Parks and Wildlife Service,
P.O. Box 5391, Townsville Mail Centre, Queensland 4810

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Silver Gulls were censused from January 1983 to March 1985 on the Capricorn and Bunker Islands. Gulls moved between the islands, congregating at sites where food scraps and people were most abundant. Such sites were permanent, as at Heron Island, or temporary when campers and fishermen were present at other islands. On winter days up to 75% of gulls in the area sought food scraps at the Heron Island resort. In summer the number present was reduced to less than 25% when secluded islands were sought for nesting. Gulls are an important predator at tern and booby colonies and this predation is increasing as a result of human activities.

INTRODUCTION

The present century has been a time of great population expansion for many species of gulls around the world. The increase is wholly or partially due to provision of food by man's urban, maritime and rural activities (Bourne 1983, Burger 1983, Blokpoel and Tessier 1985). The Silver Gull *Larus novaehollandiae* of Australia, New Zealand and South Africa is no exception and it has expanded substantially over recent decades (Wheeler and Watson 1963, Blakers, Davies and Reilly 1984). Breeding gulls on the Five Islands in New South Wales, for example, increased in number from about 2 000 in 1940 to over 100 000 in 1978 (Gibson 1979). In Australia the Silver Gull is most abundant in temperate regions but also occurs in the tropics. Nesting occurs on islands on the Great Barrier Reef, notably those of the Capricorn and Bunker Groups.

The Silver Gull population is considered to be unnaturally high on the Capricorn-Bunker Islands

as a result of human activities (Hulsman and Kikkawa 1984). Gulls scavenge table scraps, garbage and fishing offal. There are no quantitative data on the importance of these food sources locally but some estimates from other parts of the world suggest that gulls and scavenging seabirds obtain as much food from commercial fishing offal as they obtain naturally (Bourne 1983). The single most important source of food for gulls on the Capricorn-Bunker Islands appears to be foodscraps and garbage at Heron Island.

STUDY AREA AND METHODS

The Capricorn Group consists of nine islands. The Bunker Group lies to the south and has three islands two of which (Fairfax and Hoskyn) are double islands making a total of 14 in the region. All are wooded sand or shingle cays and many have *Pisonia grandis* forest. The islands are on coral reefs at the southern end of the Great Barrier Reef (Fig. 1).



Figure 1. Location map.

Silver Gulls were counted at Heron Island several times each month during 1984. Counts were taken during high or mid tide to ensure that the birds were not out foraging on the exposed reef. Most gulls occurred on the beach, particularly around the western half of the island. Small numbers also frequented kitchen and dining areas where food scraps were available. Counting was simplified by the fact that gulls never went into the forest.

Gulls were counted several times between January 1983 and March 1985 on all islands in the the region except One Tree Island. Counts were made on the beach by walking round the perimeter of each island. Unforested areas and camping areas were also inspected.

Daily occupation of the islands by campers in 1984 was calculated from permits issued by Queensland National Parks and Wildlife Service and modified by field observations of actual campers present. Daily attendance of vessels at the islands and associated reefs was derived from twice-weekly observations by surveillance flights throughout 1984. The total numbers of vessels recorded at each reef during the year were divided by the number of flights to give an indicative daily value.

RESULTS AND DISCUSSION

The results of gull counts at Heron Island are shown in Figure 2. Numbers fluctuated widely from day to day and during the day as gulls were

observed flying to and from the surrounding islands. Maximum numbers occurred during winter months when up to 930 gulls were present. Numbers dropped below 300 during the summer. Kikkawa (1970) reported a maximum of 300 gulls at Heron Island in the late 1960's and considered this to be an increase over previous years.

Heron Island is the focal point for populations of both people and Silver Gulls in the area. It has an area of approximately 19 ha and supports a tourist resort and a university field station. The western half is covered with buildings and roads and the eastern half is forested. In 1984 the human population averaged about 190 but rose to roughly 380 at times. Each day foodscraps from the resort are dumped at sea. Hundreds of gulls await this event on the beach and follow the dumping boat out to feed. Gull chicks banded on other Capricorn and Bunker Islands have been found at Heron Island within months of banding.

Barrett (1910) noted that Silver Gulls had nests at Heron Island in October 1910 but Cooper (1948) visited Heron Island in December 1946 and reported that as a result of the establishment of a tourist centre the gulls and ground-nesting terns no longer bred there. Since then there have been occasional reports of pairs of gulls nesting on Heron Island (Wheeler and Watson 1963, Hulsman and Kikkawa 1984) but breeding birds invariably seek the more secluded islands to nest.

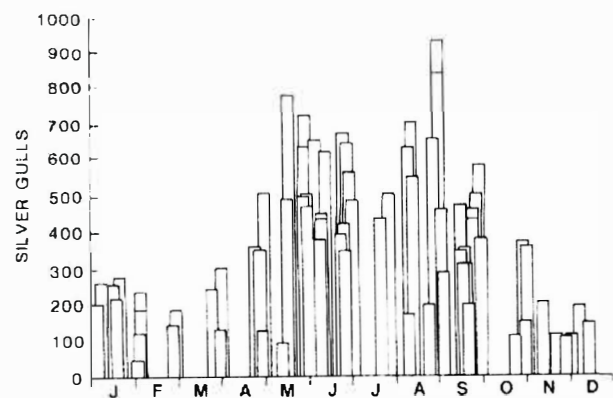


Figure 2. Numbers of Silver Gulls at Heron Island during each month of 1984.

Numbers of gulls at the other islands are summarized in Table 1. Detailed examination of counts revealed three facts. Firstly, numbers of gulls on an island often varied greatly over short time periods. Secondly, movement of gulls from island to island was strongly influenced by the presence of people. Thirdly, the summer decrease in gull numbers at Heron Island coincided with an increase in gull numbers on many of the nesting islands. An estimate for the total average gull population on the islands in 1984 is approximately 1 200. Total numbers fluctuate as a result of movement to and from the mainland (Hulsman 1979, also banding returns). The closest island is little more than an hour's flight from shore (45 km). Silver Gulls fly up to three times this distance to feed on garbage dumps in Sydney (van Tets 1969).

Gulls are attracted to a particular island for feeding and/or breeding. In the Capricorn-Bunker region four types of attractant can be described: natural non-avian food sources; avian food sources; human food sources; and nesting sites.

Natural non-avian food sources

Natural food consists primarily of small invertebrates and fish foraged from the reef flat and

intertidal zone. As well there is some consumption of insects (Embury 1933, Cooper 1948, Hulsman 1974), berries (e.g. *Solanum americanum*) and turtle hatchlings when these are seasonally available. It appears that if the above sources of food are the only attraction of the island then the number of gulls is low. This is best demonstrated at North Reef Island which had the lowest gull visitation of any island (Table 1). At this island, avian food sources (seabird colonies) are few (Walker and Domm 1986); there are no gull nesting sites and the availability of human foodscraps is minor as evidenced by the low human visitation (Table 1).

Avian food sources

Gulls are the major natural predator of eggs and chicks at tern and booby colonies in the region. High clutch mortality (up to 100%) has been observed at small tern colonies (Embury 1933, Cooper 1948, Hulsman 1977). Gulls also deprive chicks of food by robbing fish from the parents (Hulsman 1976). These activities are seasonal and are most extensive at east Fairfax Island, which has the only large Brown Booby *Sula leucogaster* colony in the region. Brown Boobies breed mainly from August to April. Egg or fish robbing by gulls is highly developed, particularly when boobies are disturbed at their nests

TABLE 1

Visitation to Capricorn and Bunker Islands by campers (1984), vessels (1984) and Silver Gulls (January 1983-March 1985).

Island	Area (ha)	Campers/day		Vessels/day		Silver Gulls		
		Mean	Max.	Reef Mean	Mean	Min.	Max.	(n)
North Reef	1	—	—	0.1	10	3	24	13
Tryon	11	12	30	1.6	49	12	120	13
North West	105	32	150	4.1	51	4	147	20
Wilson	5	1	25	0.5	53	6	120	12
Wreck	6	—	—	0	70	4	230	12
Masthead	40	19	80	2.8	110	15	237	12
Erskine	2	—	—	0.4	27	10	70	12
Hoskyn (east)	2	—	—	} 0.5	16	8	30	4
Hoskyn (west)	6	—	—		69	2	200	8
Fairfax (east)	19	—	—	} 0.8	133	28	400	10
Fairfax (west)	4	—	—		22	6	40	6
Lady Musgrave	19	6	75	6.2	100	17	260	16

by the presence of people. After Heron Island, the highest numbers of gulls were present at east Fairfax Island (Table 1). This is attributable to the presence of the booby colony because human visitation was relatively low and hence foodscraps were few.

Human food sources

Away from Heron Island the main foods available through human agency are offal discarded by fishermen and table scraps from campers and people on boats. On Masthead and Wilson Islands the highest number of gulls were recorded when the highest numbers of campers were present. The correlation between numbers of gulls and numbers of campers is most clearly demonstrated at North West Island where gull numbers are not influenced by nesting (Fig. 3).

Gulls and other ground-nesting birds do not nest on North West Island because it has had a population of feral cats since the 1890's (Cribb 1969). In October 1910 Campbell and White (1910) recorded small numbers of gulls frequenting the beach but no sign of nesting. The situation appears to have been different in November and December of 1925 and 1926 when MacGillivray (1926, 1928) and Gilbert (1925) reported several pairs of gulls to be nesting. They also noted that the gulls fared well from the offal produced by the turtle soup factory that operated from 1924 to 1928. MacGillivray (1931) noted only about a dozen gulls on the beach in May 1930 as the turtle factory was closed each year at that time. It would seem that gulls nested despite the presence of cats (which feed mainly on nesting Wedge-tailed Shearwaters *Puffinus pacificus* during summer) so long as there was an easy food source at the turtle factory. In May 1984 a cat was witnessed killing a gull in the camping area. (Following this study a cat eradication programme commenced in 1985 and a single unfluffed gull was present in May 1986).

In the absence of campers the average number of gulls present at North West Island can be calculated from the regression equation of Figure 3 to be only 22. This equation can be applied to Heron Island, inserting numbers of human occupants

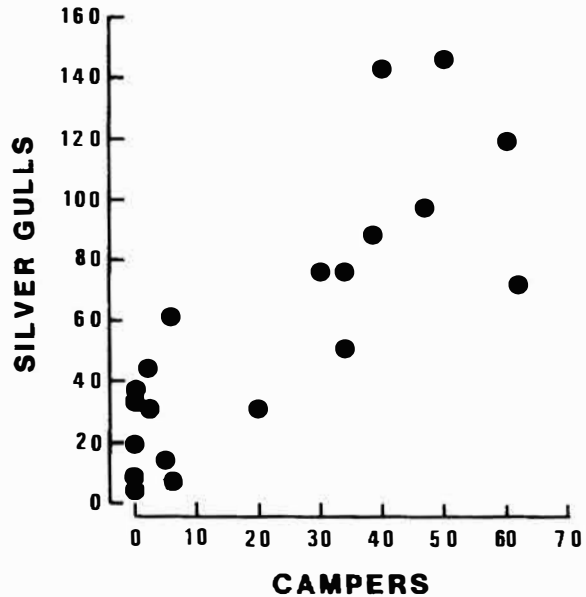


Figure 3. Relationship between Silver Gulls and campers at North West Island. $Y=1.65X + 22$ ($R=0.82$, $P<0.001$).

rather than campers. Calculation using an average 190 occupants gives 335 gulls while the maximum 380 occupants gives 650 gulls. These results fit well with the actual numbers of gulls present (Fig. 2). The equation is not suitable for the other camping islands because gull numbers are influenced by nesting as well as by numbers of campers.

Nest sites

June was the only month when eggs or chicks were not observed on at least one island but most breeding occurred during the warmer months of the year (October-April). Nesting occurred on all islands except Heron, North West, North Reef and east Hoskyn. Heron Island, as noted above, is overpopulated by tourists. North West Island has feral cats, and the other two are very small and remote islands. At any time fewer than 300 gulls were nesting in the region. The major nesting islands were Masthead, Wreck and Lady Musgrave. It seems likely that the islands are nesting sites for gulls from the mainland as well as for resident gulls. Wreck Island is particularly

suitable to examination of nesting occupation because there is no human visitation and foodscraps are not available.

Since 1982 Wreck Island has been enclosed by a Marine Park Preservation Zone where public entry is prohibited. The absence of people makes the island an unattractive source of food to gulls and winter numbers (May-August) ranged from four to 20 birds. In the warmer months it becomes an important nesting site and counts greater than 200 were recorded. The numbers actually nesting are difficult to estimate because of the secretive behaviour of breeding gulls. Gulls were previously reported nesting at Wreck Island in October by Booth (1970).

Management problems

The Capricorn-Bunker gulls are less numerous than those on some southern Australian islands but they have a considerable impact on the breeding success of other seabird species. These islands constitute a principal seabird breeding area for the Great Barrier Reef. Under natural conditions the seabird colonies co-exist with gull robbing but the level of robbing is raised by human activities. Seabirds are disturbed from their nests when approached by people and eggs are left unprotected. As well as this, the availability of human foodscraps supports an increased gull population leading to higher predation on seabird colonies. Foodscraps are available on the islands and on the mainland.

Predation of turtle hatchlings is increased by an expanded gull population. The Capricorn and Bunker Islands are principal nesting areas for Green *Chelonia mydas* and Loggerhead Turtles *Caretta caretta* on the Great Barrier Reef. When gulls are abundant they may take large numbers of turtle hatchlings that cross the beach during daylight (Nebe 1928, Bustard 1972).

Control measures have sometimes been introduced elsewhere in the world where increasing gull populations have threatened populations of seabirds. These have included poisoning, shooting, netting, trapping, sterilizing, raking of nests and introduction of foxes and racoons to colonies (Nelson 1980). Massive control measures have also been implemented at airports because of

human deaths and loss of aircraft during gull strikes (summarized by Burger 1983). On the Capricorn and Bunker Islands it should be possible to reduce gull numbers by restricting their access to foodscraps. Gulls would be deprived of the Heron Island garbage if it were to be dumped at sea in darkness rather than in daylight. A campaign to educate tourists, campers and fishermen not to make food available to gulls has recently commenced. In the long term similar measures might be considered for the adjacent mainland if the Silver Gull population continues to expand.

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OBSERVATIONS OF PREDATION ON NESTLING EGRETS

GREGORY S. BAXTER

Shortland Wetlands Centre, P.O. Box 130, Wallsend, New South Wales 2287
and
Centre for Environmental and Urban Studies, Macquarie University, New South Wales 2109

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On 5 January, 1987 observations were made of an attack by an adult Wedge-tailed Eagle *Aquila audax* on nesting Cattle Egrets *Ardeola ibis*. The incident occurred on a mixed breeding colony of egrets at the Shortland Wetlands Centre, Shortland, New South Wales, (32°51'S., 151°42'E.). This colony contains four species: Great Egret *Egretta alba*, Intermediate Egret *E. intermedia*, Little Egret *E. garzetta*, and Cattle Egret.

At 10:22 hours a large disturbance of adult birds on the north-eastern side of the heronry attracted my attention. Large numbers of adults had taken flight and had begun to call loudly. The source of the disturbance was an adult Wedge-tailed Eagle which swooped down rapidly into a Cattle Egret nest occupied by an adult and at least two nestlings. The nest was approximately 14 m from the ground in a Broad-leaved Paper Bark

Melaleuca quinquenervia, which was itself approximately 25 m high. The nest was in an exposed situation on the northern side of the tree. Other Cattle Egret nests were scattered through the tree higher and lower than this nest. All the adults in this and surrounding trees which had not previously taken flight immediately did so. The young attempted to escape by running and hopping to branches out of the eagle's reach. Large numbers of other young egrets fled their nests and took refuge in the small upper branches of trees.

The eagle quickly caught the two nestlings and killed or disabled them, then vigorously chased other nestlings through the foliage, as well as its bulk would allow. The eagle rested several times and then returned to the chase. During this period the eagle was ineffectually mobbed by adult Cattle Egrets and Little Egrets, which were nest-