

NOTORNIS

Journal of the Ornithological Society of New Zealand

ISSN 0029-4470

VOLUME 46

PART 4

DECEMBER 1999

Increase of gannets (*Morus serrator*) at Muriwai, Auckland

BRENDA S. GREENE

Auckland Regional Council, Private Bag 92012, Auckland

ABSTRACT

The growth of New Zealand's second mainland Australasian gannet (*Morus serrator*) colony at Muriwai, north west Auckland is described from counts between 1975 and 1998. The colonies on Motutara Island, and the southern and northern colonies on Otakamiro Point have increased from 28 pairs in 1975 to 1393 pairs in 1998. The potential for future colony expansion on the northern cliff face, where human disturbance is highest, is discussed.

KEYWORDS: Australasian gannet, population increase, Muriwai, New Zealand

INTRODUCTION

The Takapu refuge on Otakamiro Point at Muriwai Regional Park, comprises New Zealand's northernmost mainland gannet colonies. Now a popular tourist destination, there is some concern that human disturbance may be affecting the productivity of the Muriwai colonies.

The Muriwai colonies, comprising Motutara Island, the southern and the northern cliff platforms, established during the 1970's. Based on banding studies, and the fact that the Oaia Island colony decreased before the 1980/81 census (Wodzicki *et al.* 1984) it is likely that gannets colonised Motutara Island from Oaia Island (Nicholson 1979). Gannets also probably arrived from elsewhere, such as Gannet Island, offshore

from Kawhia (C. Robertson, pers. comm.). In 1975/1976, gannets bred for the first time on Motutara Island, when 28 pairs were recorded (Reed 1979), and by 1980/81, 298 pairs were nesting there (Wodzicki *et al.* 1984).

In 1979, gannets bred on the southern cliff platform on the adjacent mainland at Otakamiro Point, but were disrupted by vandals and dogs (Wodzicki *et al.* 1984). In 1981, the Auckland Regional Council and Royal Forest and Bird Protection Society constructed a fence around the cliff platforms to protect the colonies.

The increase in gannet numbers from 1975 onwards has been documented by the Ornithological Society of New Zealand (OSNZ), Auckland region, and by the author. The results of these counts are presented, observations of disturbance are recounted and implications for the future management of the colony are discussed.

STUDY AREA AND METHODS

Muriwai Regional Park is located about 30km north west of Auckland City, at the northern boundary of the Waitakere Ranges (Figure 1). Otakamiro Point is the headland between Maori Bay and Muriwai Beach. It is crown-owned land managed by the Auckland Regional Council as the Takapu Refuge. Three rocky platforms extend from this point - the northernmost is a low reef known as Fisherman's Rock. The other two are wide cliff-top ledges - one is known as the southern cliff platform, and the other as the northern cliff platform. A wide fenced track leads to two viewing platforms directly over each cliff platform. Motutara Island lies about 30m offshore, between the two cliff platforms. Oaia Island lies about 1.5km SW of Otakamiro Point.

Long term trends

Annual counts of the number of pairs and the total number of birds present on Motutara Island, the southern and northern colonies were obtained from OSNZ records. The counts were usually undertaken in October (M. Taylor, pers. comm.), near the start of the breeding season, but the time of the day of most counts was not recorded. Birds on Motutara Island and the southern cliff were counted from the southern lookout platform, while birds on the northern cliff were counted from the northern lookout platform. Birds on the mainland sites were counted from the track to the northern colony. To allow between year comparisons, totals from October were compared.

Annual trends

I made monthly and fortnightly censuses from September 1994 until June 1996 between 09:00 and 10:30. The birds were counted from the same locations described above, beginning with the southern lookout platform, and ending with a count of birds prospecting and nesting on the mainland proper. The gannets on Motutara

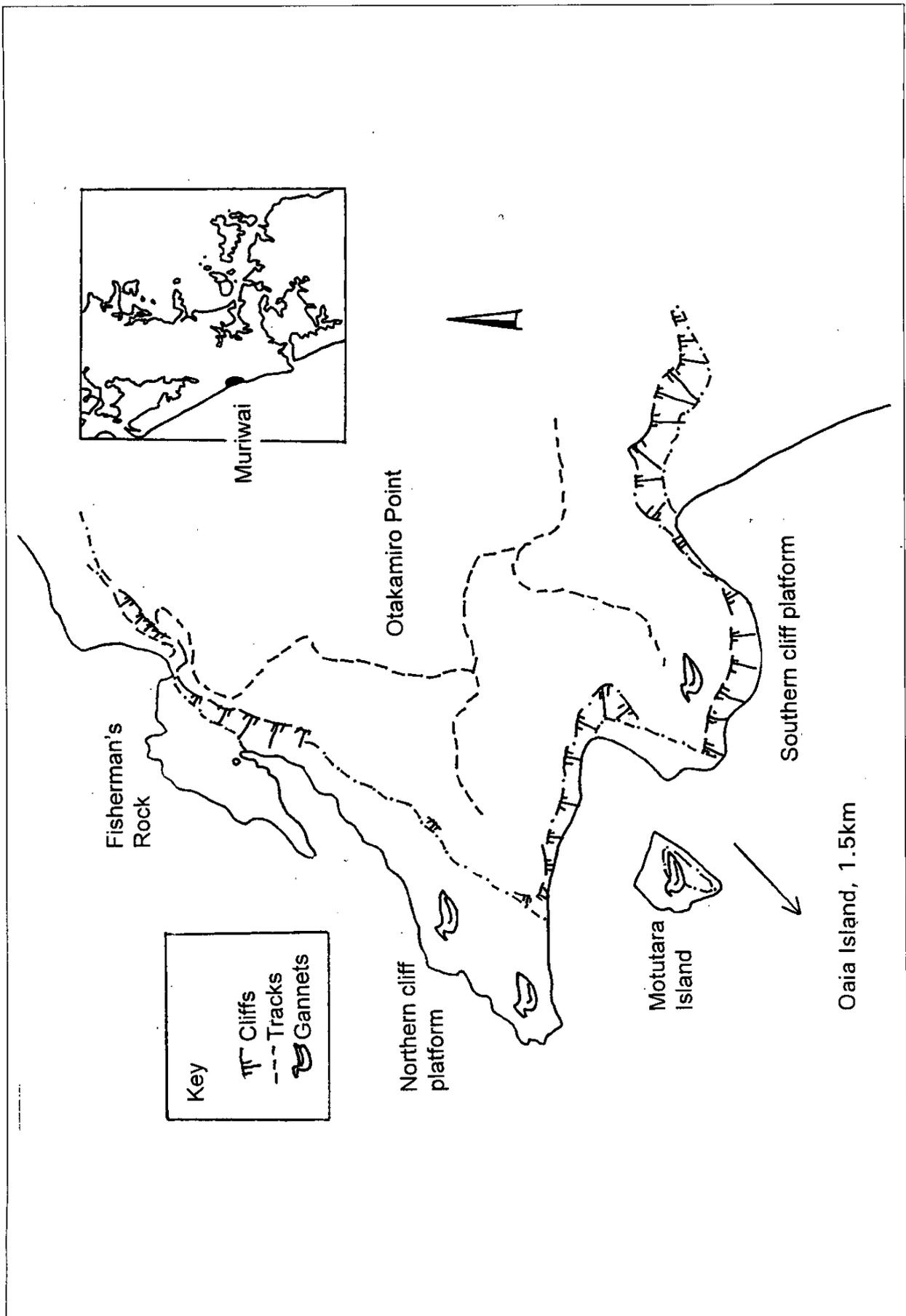


FIGURE 1 - Location of the gannet colony, Takapu Refuge, Muriwai Regional Park

Island were observed through 10x25 binoculars, and a tally counter was used.

Total gannet numbers were estimated by counting birds and nests within the following categories: *Pairs*: pairs were estimated by the number of active nests. A nest was considered active if one or two birds occupied a nest or guarded a collection of nest material, or if there was an empty nest that was obviously being maintained, *chicks*: chicks were recorded as either with an adult or without an adult, *singles*: one adult bird occupying a site with no nest or nesting material. The *total number* of birds was calculated by multiplying the number of pairs by two, then adding the number of singles and chicks.

During each census, three counts were made within each category, and the average count recorded. Photographs were taken of the southern colony to provide a check on numbers. One or two counts were undertaken each month. The counts were made within a week each side of the middle of the month and within a week of the end of each month, so that at a minimum each count was made every fortnight. Monthly counts were undertaken mid-monthly during 1994, and fortnightly counts were undertaken from August 1994 to March 1996. When more than one count was made per month, the average of count totals was calculated. On 15 February 1995, an egg and chick count was undertaken.

Daily trends

One 12 hour count was made on 16 January 1996. The total number of birds, the number of chicks (attended and unattended) and single birds were recorded. Counts were undertaken every hour from 05:00 (dawn) until 17:00 (sunset at 20:00). In addition, photographs were taken every hour of the southern cliff colony.

RESULTS

Long term trends

OSNZ records from 1975 to 1991 (Figure 2) show that gannet numbers continued to increase until Motutara Island reached its peak capacity of 250-300 pairs in 1983. In 1979, gannets began to colonise the southern cliff platform of Otakamiro Point, which reached its peak capacity of 250-270 pairs in 1988. In 1986, gannets began to colonise the northern headland. Overcrowding on the southern colony most likely triggered nesting on the northern cliff platform.

In 1991/92, gannets began nesting on the grassy slopes of the headland immediately north of the northern lookout platform. No successful breeding has yet been recorded in this area, although in 1996, one chick and the parent attending it died of starvation (autopsy performed by W. Boardman). Prospecting also began during this time on the northern lookout platform, and on the approach track, as well as directly below the lookout platform, outside the fence.

Overall, the general trend of the number of gannet pairs since 1975 was a slow

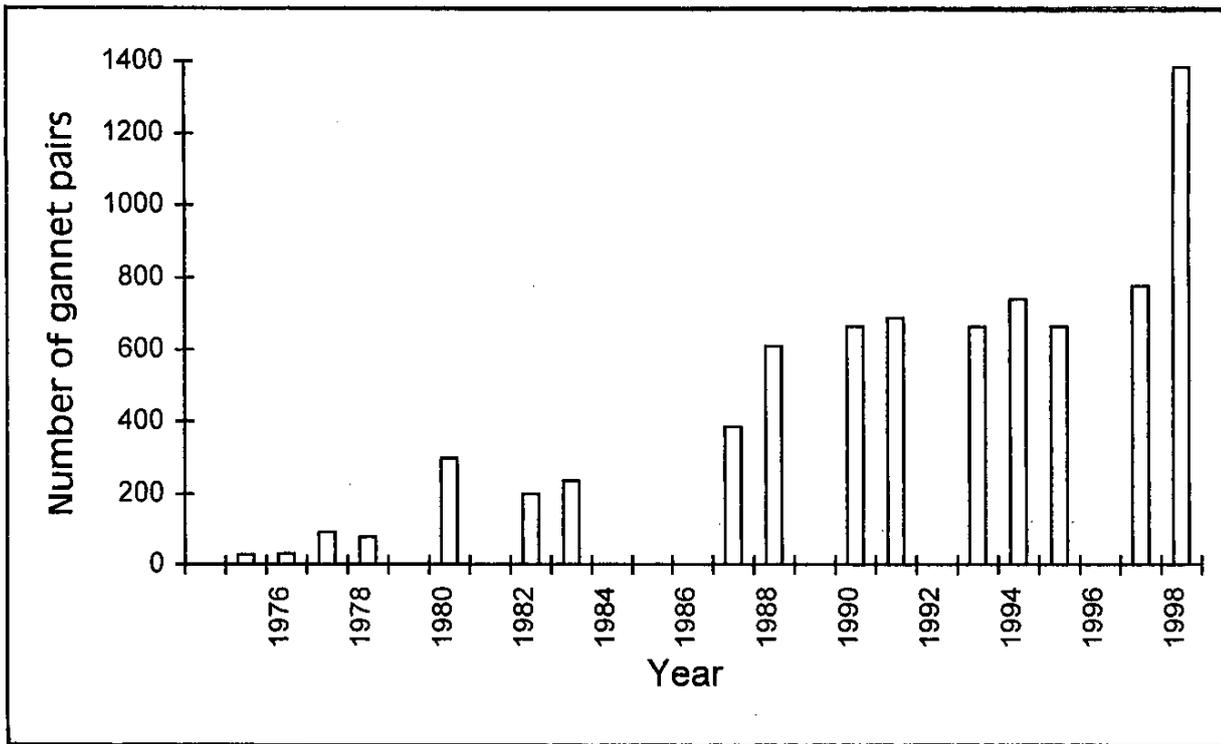


FIGURE 2 - Combined annual censuses of gannets at Muriwai colonies, 1975-1998 (OSNZ summarised records).

increase until 1980, a rapid increase between 1980 and 1988, followed by stable numbers of around 700 pairs since then. The results show a typical S-shaped growth curve of an establishing population, followed by a period from about 1990 onwards where carrying capacity was apparently reached. Note, however, that the timing of OSNZ counts underestimates the average number of birds present at the colonies over a season.

Overall there was a total of 2500-2700 birds on Motutara Island, the southern cliff platform and the northern cliff platform (compare to a total of 56 birds recorded by Reed (1979)). October 1998, however, showed a marked increase in the number of birds, to 1383 pairs, implying that the colony may again expand. Most of this increase has occurred on the southern cliff colony.

Annual trends

The highest number of gannet pairs was on the southern cliff platform, with peak pair numbers being reached each February (Figure 3). Motutara Island held more gannets than the northern cliff platform. The trends for all three areas were similar, with peak numbers of gannets usually in January and February, coinciding with hatching. A higher total number of birds could occur later, however, as was recorded in April 1995, when a large number of single birds arrived at the colony.

High numbers of pairs can occur in winter (April to June) on the mainland

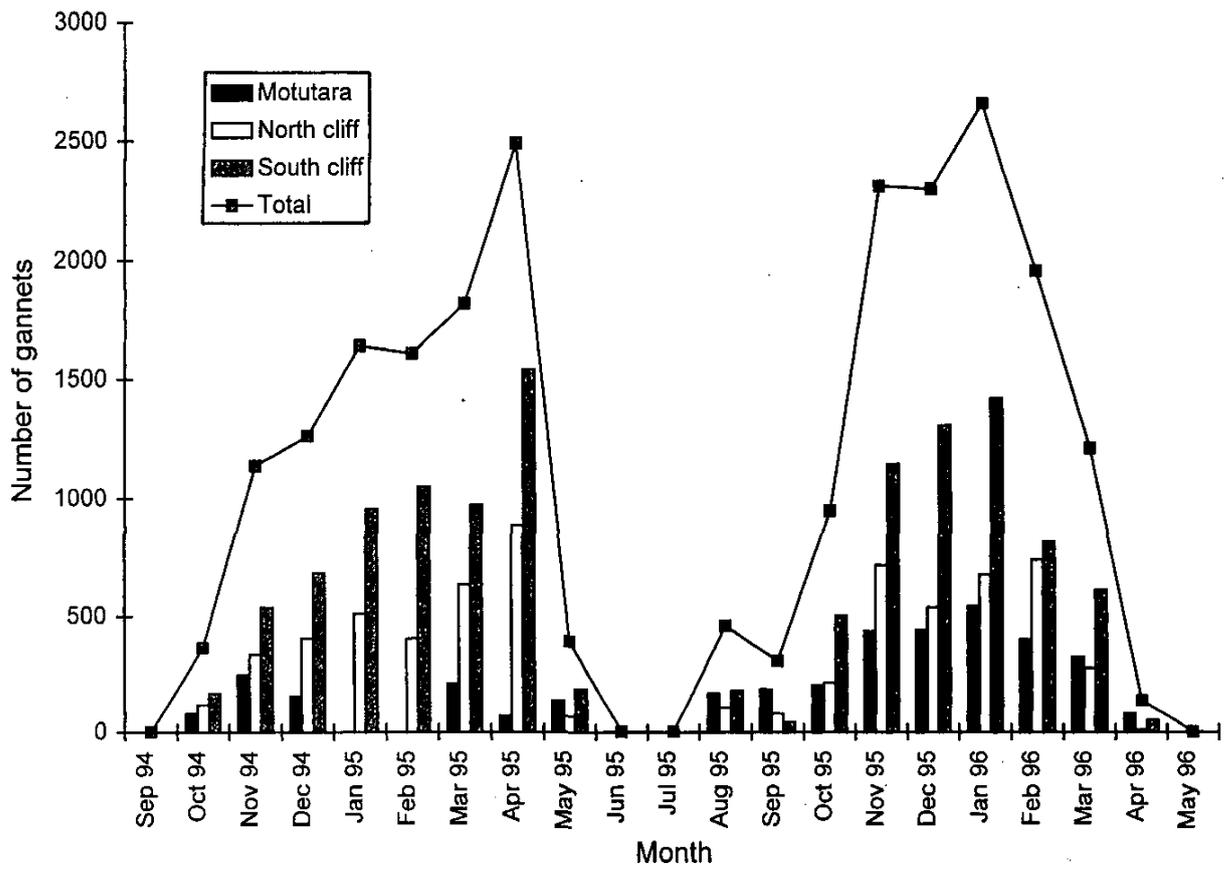


FIGURE 3 - Monthly counts of gannets on Motutara Island, the southern cliff platform and the northern cliff platform from August 1994 to March 1996.

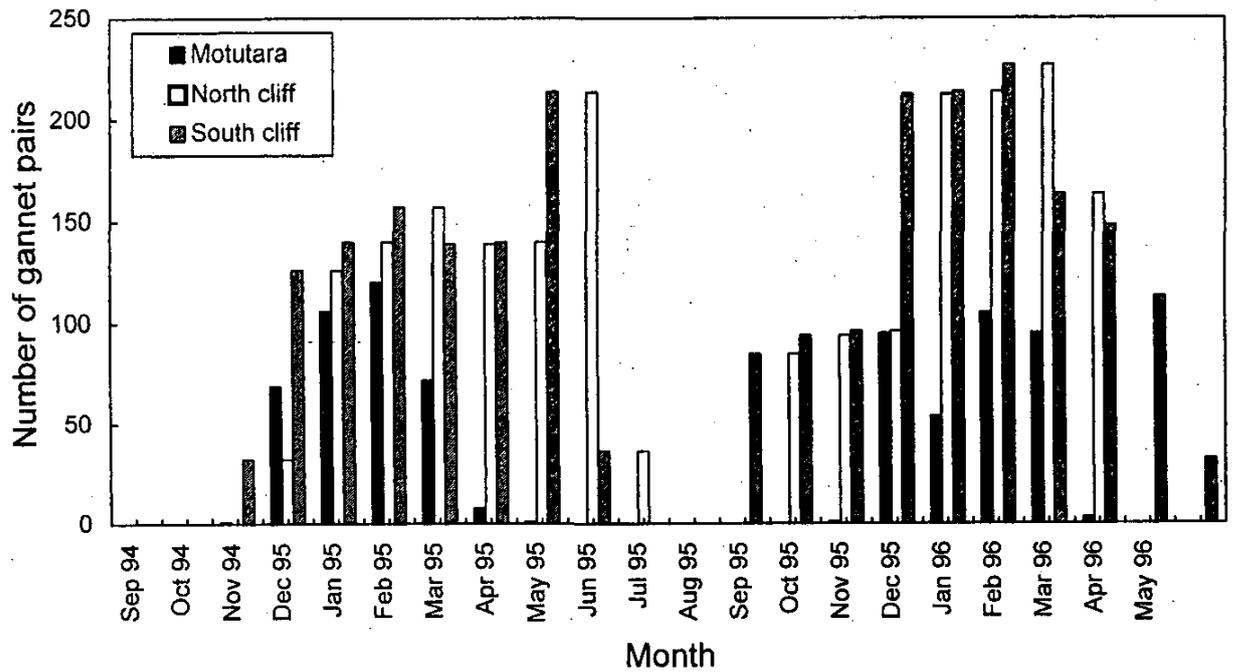


FIGURE 4 - Monthly counts of gannet pairs on Motutara Island, the southern cliff platform and the northern cliff platform from August 1994 to March 1996.

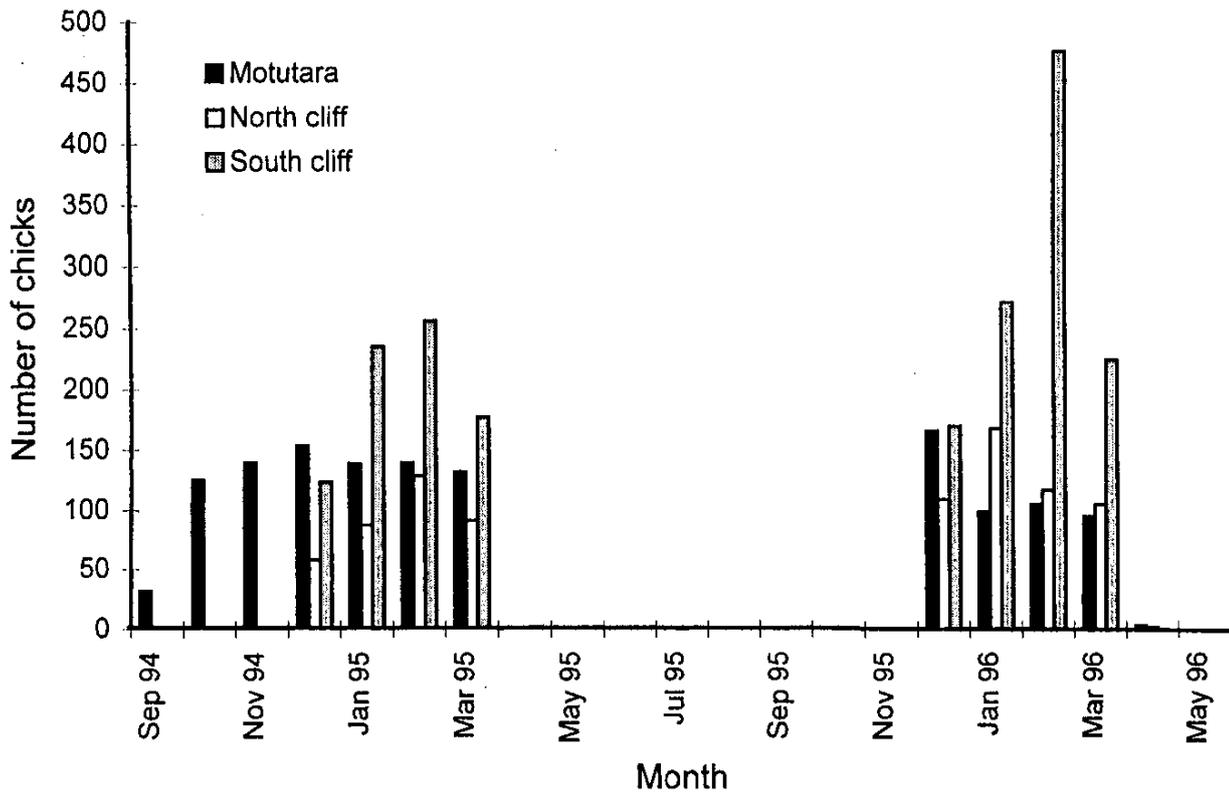


FIGURE 5 - Number of chicks on Motutara Island, the southern cliff platform and northern cliff platform from August 1994 to March 1996.

TABLE 1- Relationship of Australasian gannets pairs and chicks at Muriwai 1995/96

| Month | Pairs | Chicks | Month | Pairs | Chicks |
|--------|-------|--------|--------|-------|--------|
| Dec 94 | 674 | 1 | | | |
| Jan 95 | 664 | 251 | Jan 96 | 1092 | 374 |
| Feb 95 | 632 | 429 | Feb 96 | 602 | 493 |
| Mar 95 | 666 | 505 | Mar 96 | 388 | 422 |
| Apr 95 | 1226 | 341 | Apr 96 | 56 | 8 |
| May 95 | 140 | 11 | May 96 | 0 | 0 |

compared to Motutara Island. Observations suggest that two influxes of birds may occur - one early in the breeding season, and one soon after the peak of the breeding season (February to March). Some late arrivals form pairs and build nests but fail to raise chicks. Additionally, the age range of birds on the mainland appears to be much wider than that on Motutara Island. There may be a higher proportion of inexperienced first time breeders and a high rate of nest failure, resulting in two breeding attempts.

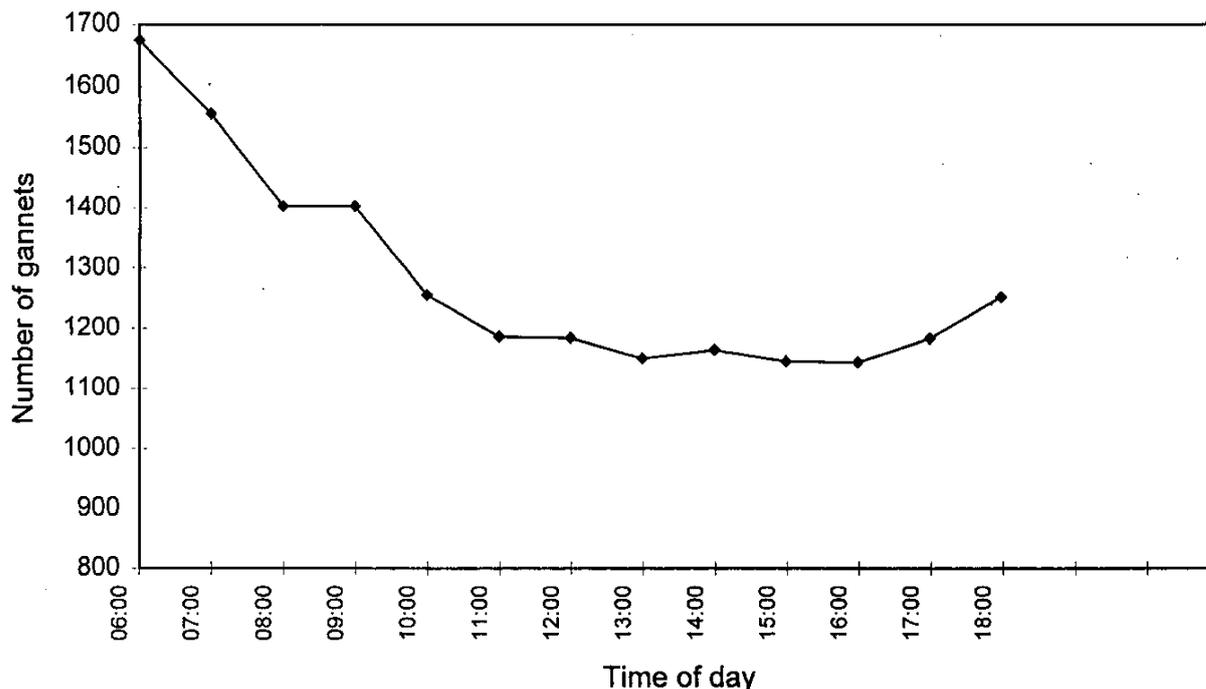


FIGURE 6 - Hourly count of gannet adults at Muriwai, 15 January 1996, from dawn to 2 hours before dusk.

Courtship and egg laying begins first on Motutara Island (Figure 4), then on the southern cliff platform about a fortnight later, then on the northern cliff platform, another fortnight later again. The main breeding season on Motutara Island occurs over a 4 month period (December to March), whereas the main breeding season of the southern and northern cliff platforms occurs over a 6 month period (December to May and January to June respectively).

Motutara Island appears to be the most desirable nesting site, and quickly reaches carrying capacity early in the season. Gannets arriving later tend to choose the southern cliff platform over the northern cliff platform. Both mainland colonies are able to receive gannets over a longer period of time than Motutara Island, resulting in the extended breeding season.

Gannets start building nests in earnest around October each year, although birds may be seen as early as August. The first chicks hatch in February, although one chick was seen as early as December (1996). The highest number of chicks, and the best time to view all stages of chick development, is during February and March (Figure 5). Most chicks have departed the colony by April.

As it was difficult to count eggs or determine relative ages of chicks without entering the colony, the number of pairs producing chicks was counted (Table 1). The 1995/96 results are slightly confusing (Table 1) because during March there were more chicks than pairs, as older chicks were abandoned by their parents, and an influx of single adults occurred.

Of interest is that chicks were present in 1995/96 over a four month period

compared with five months in 1994/95, and two gannet pairs raised two chicks each in January 1995. In 1995, gannets began courting August, compared to October in 1994. The number of gannets then decreased during September 1995, then rose again (Figure 3). The implications of this are discussed later.

Daily trends

During mid January 1996, all gannets were assumed to be at the colony when the counts began at dawn (06:00 hours). The numbers reached a minimum during the middle of the day (Figure 6). It has to be assumed that numbers peaked again towards dusk. A total of 1629 birds was counted: 560 adults and 220 chicks on the southern cliff platform, 330 adults and 234 chicks on Motutara Island, and 195 adults and 90 chicks on the northern cliff platform. About 200 (18%) birds had left the colony by 11:00. They started to return by 18:00, about 3 hours before sunset. About 900 (82%) adults remained at the colony between 11:00 and 17:00. Gannet numbers increased around 09:00 suggesting that this was a peak period for change over between nesting adults. Since fortnightly and monthly counts were always undertaken at the same time of the day (09:00), the trends in gannet numbers should be consistent, but the total numbers of birds may be underestimated by up to 18% because some birds may have already departed, and not all birds on Motutara Island were able to be counted. Observer error, as checked by photographs, accounted for 2% of the variation.

DISCUSSION

Long term trends show a steady increase in gannet numbers at the Muriwai colonies. In 1995, 1420 pairs nested at Muriwai (including an estimated 340 pairs on Oaia Island), an increase of 5.3% since 1980, or an average of 4.6% per decade since 1946.

Influxes of unmated birds can occur several times during the season, masking breeding trends if pairs are not already identified by the counting procedure. Since the total number of birds was counted by OSNZ, rather than pairs, and time of day was not recorded, there will be some inherent variation in the data from year to year. Future counts should include number of nests as well as numbers of singles and chicks. Daily trends showed a cyclical pattern, with the least number of gannets present during the middle of the day. Future counts should be undertaken at a consistent time of the day.

Annual trends show a cyclical rise in numbers, peaking when chicks are born over summer, and declining as the colonies are abandoned over winter. In 1994, this cycle was interrupted when gannets numbers decreased slightly during September 1995, then rose again (Figure 3). The decrease was most likely due to storms or lack of food during August, which resulted in the highest number of gannet wrecks ever recorded (Taylor, 1997). These losses, however, failed to have any significant

impact on the colony, which recovered its numbers within 2 weeks. This implies that nesting sites for gannets is a limiting factor for the population.

The Muriwai gannet colonies are the most accessible in New Zealand. The other two mainland gannet colonies are at Cape Kidnappers near Napier on the east coast of the North Island and Farewell Spirt at the northern tip of the North Island. Since 1991, gannets have begun prospecting the Otakamiro Point headland, track edges and the northern cliff platform. In this area, people are now able to come within touching distance of the birds, and human disturbance is increasing.

Following heavy rain and slips in 1996, the southern lookout cliff fence was removed. Slips on the northern cliff platform caused a break in the fence, and a dog entered the colony (although dogs are banned on Otakamiro Point). Since this was early in the gannet breeding season, there were no active nests and no gannets were harmed.

Long-term studies of the Cape Kidnappers gannet colony and Taiaroa Head albatross colony have shown that nature tourism has caused significant changes in breeding behaviours (Robertson 1992). The courtship and nest building phases are the most sensitive to disturbance by people, resulting in decreased productivity through nest or young abandonment (King and Cole 1991). The effect has been well illustrated at Cape Kidnappers where tourists could approach the colony fringes within touching distance of the birds. In 1967, a guide wire encouraged people to stand farther back. Within a year, breeding success improved by 50% (Robertson, 1992).

A study of the human impact on gannets at Muriwai was undertaken by Carton (1993). There were no detectable differences in the behaviour of gannets of either colony in the presence or absence of people, but results may have been compromised by the short period of study (June to October 1993), and time of day observations were taken (13:00-16:00).

The degree of human impact on the gannet colony depends upon the setting, type of human behaviour and closeness of approach. When approached slowly and closely, gannets stopped all normal interactions with other birds, became more alert and stretched their necks (pers. obs.). When approached quickly, or too closely, some birds flew away. This response was observed repeatedly on the northern colony, especially where single birds occupied sites on the northern side of the approach track early in the morning (06:00 - 07:00).

The approach of visitors is from above for both mainland colonies. Unlike the northern colony approach, the southern colony approach is screened by coastal forest, so that birds are only aware of movement on the lookout platform itself. This may cause less disturbance to the birds.

The preference for a particular colony may reflect the degree of human disturbance

at the site. Gannets colonise Motutara first, then the southern cliff platform, then the northern cliff platform. Gannets also nest on the grassy headland in preference to the northern cliff platform, which never reaches carrying capacity.

Human disturbance at the Muriwai gannet colony would decrease if the northern lookout platform and its approach were removed. Birds will most likely nest on the northern observation deck and on the approach track. A new track could be constructed below the birds, and screened with plantings. This should allow closer views of the birds with minimal disturbance. Once the lookout platform is removed, gannet counts on a fortnightly basis should be continued to allow for comparisons with data presented in this paper.

In conclusion, the mainland gannet colony at Muriwai appears to have completed one establishment phase on the rocky ledges of the cliffs, and is now entering an establishment phase onto the grassy headland. Minimising human disturbance particularly around the northern colony is predicted to aid this expansion.

ACKNOWLEDGEMENTS

The Ornithological Society of New Zealand, Auckland region, is acknowledged for permission to publish records, with special thanks to Michael Taylor. I would also like to thank Chris Robertson for advice on counting gannets, and several reviewers for editing the text.

LITERATURE CITED

- CARTON, G. A. 1993. Human impact on the behaviour and breeding success of gannets (*Morus bassana serrator*) at Muriwai. ARC Parks Technical Publication Series no. 1. April 1993. Auckland Regional Council.
- FLEMING, C. A. & WODZICKI, K. A. 1952. A census of the gannet (*Sula serrator*) in New Zealand. Notornis 5: 39-78.
- KNIGHT, R. L. & COLE, D. N. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the 56th North American Wildlife & Natural Resources Conference. Wildlife Management Institute, Washington.
- NICHOLSON, I. 1979. Gannets at Muriwai. Tara, Newsletter of the Auckland Region of the Ornithological Society. February issue: 13.
- REED, S. 1979. Establishment of a new gannetry. Notornis 26: 89-93.
- ROBERTSON, C. J. R. 1992. Effects of nature tourism on marine wildlife. Marine protection and wildlife protection conference. New Zealand Conservation Authority, Wellington. p 53-60.
- TAYLOR, G. A. 1997. Seabirds found dead on New Zealand beaches in 1995. Notornis 44: 201-212.
- WODZICKI, K., ROBERTSON, C. J. R., THOMPSON, H. R. & ALDERTON, C. J. T. 1984. The distribution and numbers of gannets (*Sula serrator*) in New Zealand. Notornis 31: 232-261.

Received 15 February 1999, accepted 6 September 1999