

MONITORING OF CAPE BARREN GOOSE POPULATIONS IN SOUTH AUSTRALIA IV. THE 1996 BREEDING SEASON AND THE SUMMERING POPULATION

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ABSTRACT

Egg counts and chick production by Cape Barren Geese *Cereopsis novaehollandiae* on the islands of the Sir Joseph Banks Group revealed that 1996, unlike 1985, 1987 and 1990, was a good breeding year with production comparable with that in 1974 and 1979. This was considered to be due to above average rainfall in April, May and June, the critical months for producing food for breeding birds. Helicopter counts of the summering population around the Murray mouth revealed a 30% decline in 1996 compared with the highest count in 1985. One possible explanation for this is a decline in breeding habitat on the small islands of the Sir Joseph Banks Group and some evidence of this is discussed. However this potential loss seems to be more than compensated by the now well-established breeding on the large areas of grassland on Reevesby Island. It may be that a greater proportion of geese produced on the islands of the Sir Joseph Banks Group are now summering on southern Eyre Peninsula rather than around the Murray mouth.

INTRODUCTION

The South Australian National Parks and Wildlife Service has conducted six surveys of Cape Barren Goose *Cereopsis novaehollandiae* breeding habitat (1974, 1979, 1985, 1987, 1990 and 1996) and four surveys of its summering congregation (1979, 1985, 1990 and 1996). These surveys comprised counts of adults, chicks, eggs and nests in the major goose breeding habitat on the Sir Joseph Banks Group islands offshore from Port Lincoln (Figures 1 and 2), and aerial survey of the summering habitat around Lakes Alexandrina and Albert. Results of previous surveys have been reported in Robinson, Delroy and Jenkins (1982), Robinson and Delroy (1986), Delroy, Robinson and Waterman (1989), and Robinson, De Groot and Fraser (1995).

Rainfall was less than average before counts of breeding geese were made on the islands of the Sir Joseph Banks Group in 1985, 1987 and 1990. In 1996 however there was an above average amount of rain around the break to the season and this was reflected in the higher levels of production of eggs and chicks on the islands.

In 1996, unlike the 1987 and 1990 counts, all

islands in the group were visited. On Reevesby Island where breeding was first recorded in 1984 (Robinson and Delroy 1986), the 1996 survey produced the first count for the whole island.

This paper discusses goose population trends, demographic shifts and changes in vegetation structure on the breeding islands of the Sir Joseph Banks Group.

METHODS

Breeding island surveys

Methods used in 1996 were as close as possible to those used in previous surveys. From 15 to 20 July 1996 four observers landed on 10 islands in the Sir Joseph Banks Group and conducted systematic counts of adults, chicks and eggs of Cape Barren Geese on each island as described in Delroy, Robinson and Waterman (1989). The remaining four islands were counted on 26 July 1996. The very small islets of Blyth and English were not surveyed.

Vegetation change on the islands over time

In 1977 photographic monitoring points were set up on two islands in the Sir Joseph Banks Group. On Roxby Island a single standard photopoint with two steel posts each 1.5 m high and set 10 m apart was established. Further details of this type of Photographic Monitoring Point can be found in Department of Environment and Planning (1982). On Partney Island there was an introduced population of Chinchilla Rabbits *Oryctolagus cuniculus* and so a rabbit-proof enclosure was established in the early 1970s. Photographic records were taken in a standard way looking diagonally across the experimental area in both the enclosure and the adjacent control area grazed by rabbits. This feral rabbit population appears to have naturally become extinct in the early 1980s and the enclosure was not maintained. The Roxby Island photopoint and the Partney Island enclosure and

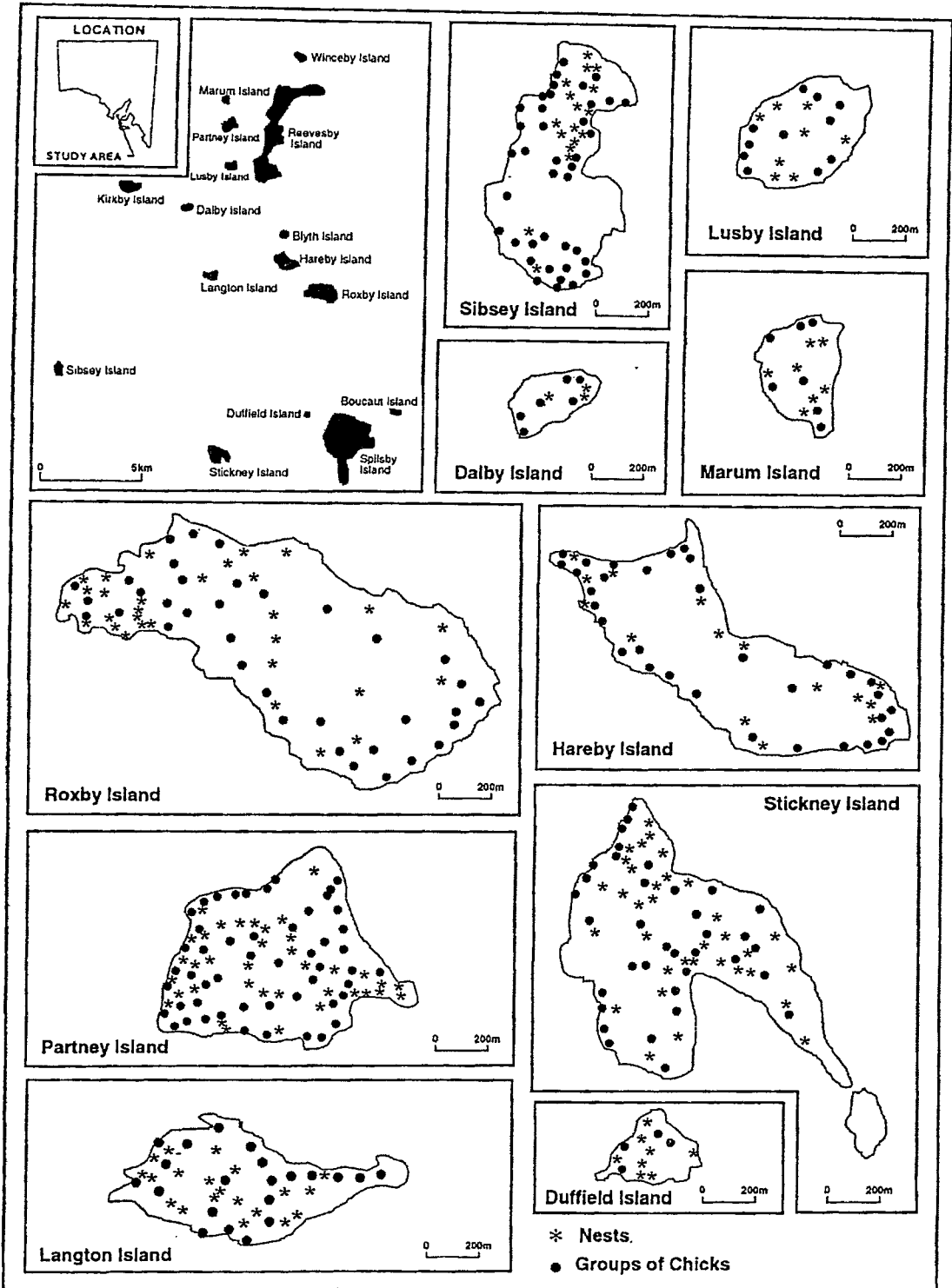


Figure 1. The distribution of Cape Barren Goose nests and groups of chicks on 10 islands of the Sir Joseph Banks Group in July 1996.

adjacent control area however were photographed opportunistically as part of the Cape Barren Goose survey program.

Comparisons from these three photopoints for 1977 and 1996 are shown in Figure 4. In addition, a diagram of the cross-sectional areas of all shrubs visible in each photopoint was prepared. Then each species was cut out and weighed and the results expressed as a percentage of the area of the total photographic field. This provided a surrogate for changes in relative shrub density. In addition, the number of recognisable individuals of each species was counted.

Summering area survey

The major Cape Barren Goose summering areas around Lakes Alexandrina and Albert were surveyed on 12 December 1996 at an altitude of 200–300 m from a Bell Jet Ranger helicopter. The flight path closely followed that shown in Robinson and Delroy (1986). Two observers were used and the pilot also spotted geese from his side of the aircraft. The route followed the edge of the lakes and using this technique geese were seen easily. Total flying time was nine hours. The helicopter disturbed about 40% of the geese observed, but double counting was

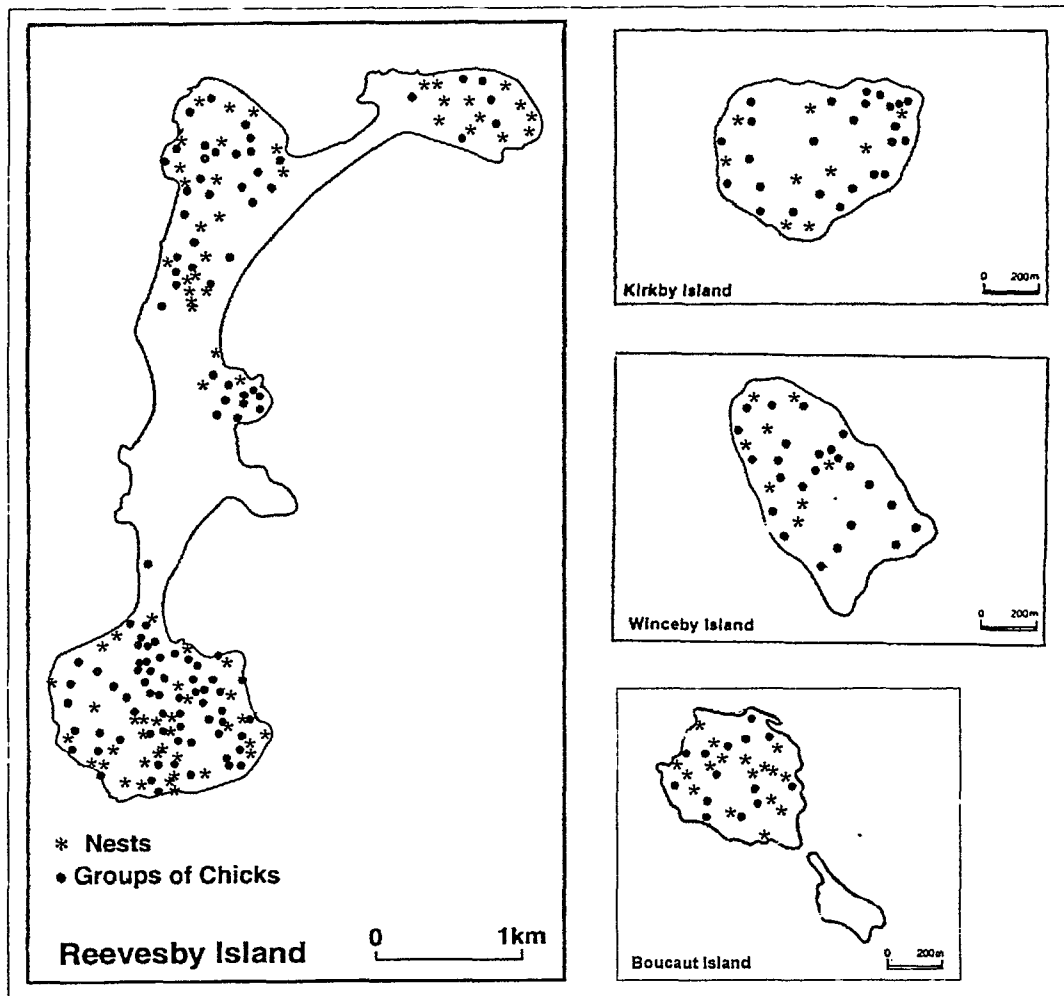


Figure 2. The distribution of Cape Barren Goose nests and groups of chicks on four islands of the Sir Joseph Banks Group in July 1996.

unlikely as they soon settled back in the area from which they were disturbed initially.

RESULTS

Breeding island surveys

The distribution of nests and groups of Cape Barren Goose chicks on 14 of the islands in the Sir Joseph Banks Group in July 1996 is shown in Figures 1 and 2. The best comparison with previously published results is with the good breeding season surveyed in June 1979 (Figure 8, Robinson, Delroy and Jenkins 1982). This shows few changes in nest and chick distribution and abundance on Boucaut, Duffield, Hareby, Kirkby and Sibsey Islands. There have been decreases on Dalby, Langton, Marum, Roxby, Stickney and Winceby Islands, while Lusby, Partney and Reevesby Islands show increases.

Details of actual counts of adults, chicks, eggs and nests counted in 1990 and 1996 are shown in Table 1. These can be compared in detail with previous counts presented in Robinson, Delroy and Jenkins (1982), Robinson and Delroy (1986), Delroy, Robinson and Waterman (1989), and Robinson, De Groot and Fraser (1995).

Although both 1990 and 1996 counts were conducted in July, the actual onset of nesting is keyed to growth of green grass on the islands. The 1996 count must have been conducted later in the breeding cycle than that in 1990 because of the reversed ratio of eggs to chicks (235:54 in 1990 compared with 403:1570 in 1996). Total production (approximated by the count of eggs plus chicks) was more than six and a half times greater in 1996 than in 1990 and with a total of 1973 eggs plus chicks which was greater than the previously recorded maximum productivity of 1482 in 1979. This difference of 491 can be totally accounted for by the emergence of Reevesby Island as a breeding area in 1984 (Robinson and Delroy 1986) with production from there in 1996 numbering 520.

The changes in the combined productivity for all the breeding islands of the Sir Joseph Banks Group are shown in Figure 3. This pattern of varying productivity over the whole group was mirrored on Boucaut, Duffield, Hareby, Kirkby and Sibsey Islands, and Figure 3 shows an example from Hareby. On Dalby, Langton, Marum, Roxby, Stickney and Winceby Islands there appeared to have been a decline in productivity since the 1970s and examples from Winceby,

Roxby and Stickney Islands are given (Figure 3). On Lusby, Partney and Reevesby Islands productivity appeared to have increased and examples from Partney and Reevesby (south) are provided (Figure 3).

Change on the islands over time

Shrub cover on Roxby Island increased between 1977 and 1996 (Figure 4A) with a concurrent decrease in bare ground. With the exception of black-anther flax-lily *Dianella revoluta*, the number of individuals of all species decreased between 1977 and 1996 (Table 2). However common boobialla *Myoporum insulare* and *Atriplex paludosa* showed a marked increase in cover during the same period. An even more obvious increase in shrub cover was evident from the Partney Island photographic comparison (Figure 4B). The quantitative comparison showed an increase in the area of *Atriplex paludosa* at the expense of *Dissocarpus biflorus* (Table 3). Over the three photopoints there was a mean increase in percent shrub cover between 1977 and 1996 of 79% on Roxby Island, 41% on the Partney Island control, but a slight decrease of 9% on the Partney island enclosure.

Summering area survey

The areas of concentration of Cape Barren Geese found during the helicopter survey are shown in Table 4.

The distribution of birds was generally similar to that recorded in 1979, 1985 and 1990 but the total numbers were reduced by 28.8% from the maximum count recorded in 1985. There appears to have been an increase in the numbers of birds using Hindmarsh and Mundoo Islands and the Point Sturt area. Less birds were using the 'Campbell Park', 'Yalkuri' and Narrung areas.

DISCUSSION

A comparison of counts of egg and chick production on the islands of the Sir Joseph Banks Group indicates that 1996 was a good breeding year more comparable with 1974 and 1979, whereas 1985, 1987 and 1990 were relatively poor breeding years. Good opening rains at the beginning of the growing season are needed to provide the new growth of grass and herbs which both adults and chicks eat through their island breeding cycle. Comparative rainfall figures for Port Lincoln for all survey years are

Table 1. Counts of adult birds, chicks and eggs of Cape Barren Geese on the islands of the Sir Joseph Banks Group in 1990 and 1996. Only the south and north ends of Reevesby Island were counted in 1990 whereas in 1996 the whole island was covered. The figures in brackets for 1990 are from counts conducted in August 1990, those indicated * are estimates, and nd = no data. The small islets of Blyth and English were not surveyed in 1996.

| Island | Eggs | | Chicks | | Eggs plus chicks | | Nests | | Adults | |
|----------------------------|------------|------------|-----------|-------------|------------------|-------------|------------|------------|------------|-------------|
| | 1990 | 1996 | 1990 | 1996 | 1990 | 1996 | 1990 | 1996 | 1990 | 1996 |
| Blyth | 0 | nd | 0 | nd | 0 | nd | 0 | nd | 10 | nd |
| Boucaut | 7* | 15 | 2* | 39 | 9* | 54 | 4* | 18 | 15* | 33 |
| Dalby | 2*(20) | 4 | 1*(0) | 23 | 3*(20) | 27 | 1*(7) | 3 | 6*(12) | 14 |
| Duffield | 0 | 4 | 4 | 15 | 4 | 19 | 3* | 8 | 3* | 15 |
| English | 0 | nd | 0 | nd | 0 | nd | 0 | nd | 11 | nd |
| Hareby | 8 | 29 | 1 | 123 | 9 | 152 | 3 | 17 | 60 | 45 |
| Kirkby | 12* | 10 | 3* | 99 | 15* | 109 | 7* | 6 | 30* | 40 |
| Langton | 7 | 38 | 5 | 77 | 12 | 115 | 7 | 21 | 25 | 68 |
| Lusby | 20 | 4 | 0 | 33 | 20 | 37 | 4 | 9 | 10 | 31 |
| Marum | 4*(42) | 13 | 0 | 21 | 4*(42) | 34 | 3*(38) | 10 | 10*(-) | 36 |
| Partney | 41 | 37 | 2 | 275 | 43 | 312 | 20 | 37 | 90 | 90 |
| Reevesby (south end) | 33 | 48 | 6 | 216 | 39 | 264 | 13 | 34 | 150 | 141 |
| Reevesby (north end) | 22* | 23 | 4* | 18 | 26* | 31 | 9* | 12 | 100* | 45 |
| Reevesby (total island) | — | 127 | — | 393 | — | 520 | — | 68 | — | 328 |
| Roxby | 34 | 66 | 8 | 145 | 42 | 211 | 23 | 34 | 100 | 88 |
| Sibsey | 28 | 13 | 15 | 135 | 43 | 148 | 27 | 20 | 40 | 80 |
| Stickney | 4 | 26 | 0 | 109 | 4 | 135 | 8 | 37 | 25 | 200 |
| Winceby | 13* | 17 | 3* | 83 | 16* | 100 | 8* | 7 | 30* | 141 |
| Totals | 235 | 403 | 54 | 1570 | 289 | 1973 | 140 | 295 | 715 | 1209 |

shown in Table 5.

The combined rainfall for April, May and June, the critical months for producing food for breeding birds, was 7% above the mean in 1974, 8% above in 1979, 17% below in 1985 and 12% below in 1987 (Delroy, Robinson and Waterman 1989). In 1990, rainfall for these months was only 3% below the average but the majority of this rain fell in June producing a significantly later break to the season. In 1996 the April to June total was 10% above the mean.

It is also necessary to examine the variations in the patterns of production from individual islands compared with the total for the group as a whole. There is a suggestion of an overall decline in productivity on Dalby, Langton, Marum, Roxby, Stickney and Winceby, while Lusby, Partney and Reevesby are increasing. Robinson, De Groot and Fraser (1995) suggested that, in addition to the poor breeding seasons in 1985, 1987 and 1990, there could be a gradual reduction

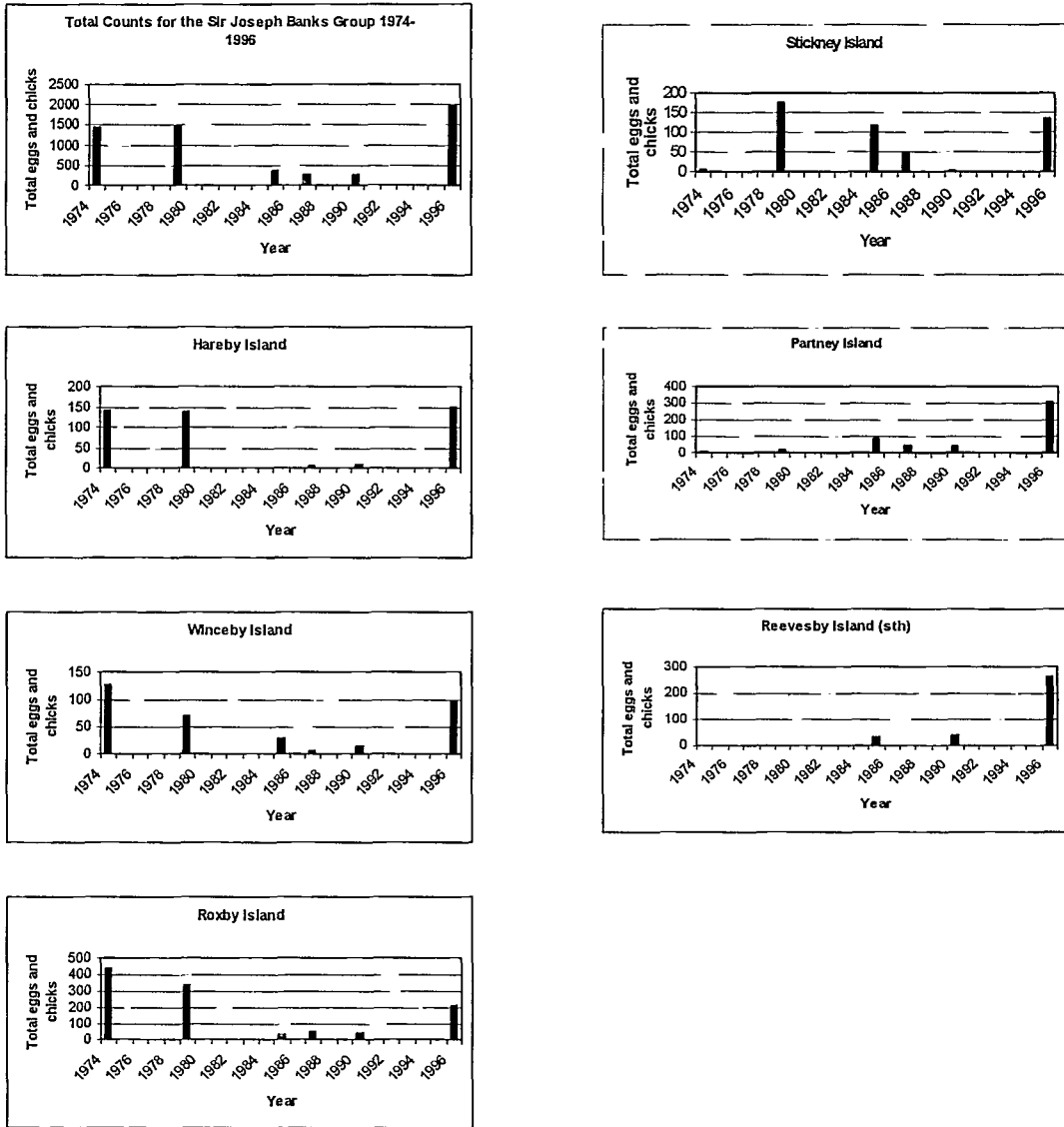


Figure 3. Productivity variation in Cape Barren Geese on the islands of the Sir Joseph Banks Group, 1974–96.



A 1977



1996



B 1977



1996



C 1977



1996

Figure 4. Changes in the vegetation on islands of the Sir Joseph Banks Group, 1977–1996. A. Roxby Island Photopoint; B. Partney Island Rabbit impact monitoring (control); C. Partney Island Rabbit impact monitoring (exclosure).

Table 2. Changes in shrub numbers and percent cover at the photopoint on Roxby Island from 1977 to 1996. N = number of individuals, % = percentage of total area.

| Species | Year: 1977 | | 1996 | |
|-----------------------------|------------|-------------|-----------|-------------|
| | N | % | N | % |
| <i>Myoporum insulare</i> | 8 | 12.3 | 7 | 20.5 |
| <i>Atriplex paludosa</i> | 19 | 45.5 | 6 | 61.4 |
| <i>Dissocarpus biflorus</i> | 9 | 7.5 | 8 | 3.6 |
| <i>Dianella revoluta</i> | 4 | 7.8 | 7 | 9.1 |
| <i>Enchylaena tomentosa</i> | 2 | 5.2 | 1 | 4.5 |
| Total Shrubs | 42 | 78.3 | 29 | 99.1 |
| Areas of Bare Ground | | 21.7 | | 0.9 |

Table 3. Changes in shrub numbers and percent cover at the photopoints on the Partney Island rabbit exclosure from 1977 to 1996. N = number of individuals, % = percentage of total area.

| Species | Year: 1977 | | | | 1996 | | | |
|-------------------------------|------------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| | Control | | Exclosure | | Control | | Exclosure | |
| | N | % | N | % | N | % | N | % |
| <i>Dissocarpus biflorus</i> | 29 | 17.1 | 43 | 69.6 | 29 | 22.5 | 34 | 56.1 |
| <i>Atriplex paludosa</i> | 2 | 6.8 | 0 | 0.0 | 10 | 9.2 | 5 | 4.6 |
| <i>Enchylaena tomentosa</i> | 3 | 4.8 | 0 | 0.0 | 3 | 6.9 | 1 | 1.4 |
| <i>Tetragonia implexicoma</i> | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 1.1 |
| Total Shrubs | 34 | 28.7 | 43 | 69.6 | 42 | 38.6 | 41 | 63.2 |
| Areas of Bare Ground | | 71.3 | | 30.4 | | 61.4 | | 36.8 |

in Cape Barren Goose habitat as the grassland areas are being recolonised by shrubs following the removal of sheep in 1967. The comparison of shrub cover between 1977 and 1996 on Roxby Island (Figure 4) clearly demonstrates this increase in shrub cover and supports the observed decline in productivity on this island. However, Partney Island shows a similar increase in shrub cover, but here goose productivity has increased. This is possibly due to differences in the vegetation on these two islands. Roxby Island is predominantly a *Myoporum insulare* tall shrubland with *Olearia axillaris* tall shrubland on a dune system (see Robinson *et al.* 1996 for a vegetation map). *Atriplex paludosa* low shrubland, which provides the best goose breeding habitat, is confined to the edges of Roxby Island. Partney Island on the other hand, was grazed

much more heavily during the period when the islands were farmed and is now predominantly a grassland regenerating towards an *Atriplex paludosa* low shrubland in many areas. The increase in low shrub species diversity as this regeneration process proceeds, may well be actually improving the goose breeding habitat as indicated by the productivity trend observed.

Increased productivity on the breeding islands has not been reflected in increased numbers of geese on the summering areas around the Murray mouth lakes, possibly because more of the birds now summer on southern Eyre Peninsula than was the case in earlier years. The only attempt at a complete count of summering birds to date was that conducted in 1979–80 (Robinson, Delroy and Jenkins 1982) when nearly four times the number of birds summered at the Murray mouth

Table 4. A comparison of the number of Cape Barren Geese sighted around Lakes Alexandrina and Albert during helicopter surveys in December 1979, 1985, 1990 and 1996. The counts are ordered in a clockwise direction from Goolwa, around Lakes Alexandrina and Albert and returning to Goolwa.

| Area | Year | | | |
|-----------------------------|-------------|-------------|-------------|-------------|
| | 1979 | 1985 | 1990 | 1996 |
| Dog Lake | 35 | 0 | 12 | 0 |
| Mosquito Point | 234 | 0 | 58 | 166 |
| 'Mulgundawa' | 197 | 166 | 197 | 334 |
| 'Poltalloch' | 0 | 53 | 34 | 50 |
| Narrung | 0 | 101 | 42 | 37 |
| Lake Albert & Waltowa Swamp | 508 | 230 | 330 | 372 |
| 'Campbell Park' | 615 | 900 | 377 | 156 |
| 'Yalkuri' | 540 | 514 | 190 | 111 |
| Mundoo Island - Tauwitchere | 95 | 233 | 251 | 144 |
| Hindmarsh Island | 0 | 181 | 219 | 255 |
| Point Sturt | 22 | 164 | 265 | 186 |
| Totals | 2246 | 2542 | 1975 | 1811 |

Table 5. Monthly rainfall (mm) for Port Lincoln in 1974, 1979, 1985, 1987, 1990 and 1996 and the mean monthly rainfall for that station (Source: Bureau of Meteorology, Adelaide).

| Year | Month | | | | | | | | | | | |
|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | J | F | M | A | M | J | J | A | S | O | N | D |
| 1974 | 31 | 1 | 4 | 62 | 87 | 34 | 115 | 66 | 55 | 71 | 13 | 7 |
| 1979 | 3 | 23 | 22 | 95 | 66 | 24 | 61 | 70 | 111 | 43 | 32 | 14 |
| 1985 | 2 | 11 | 20 | 42 | 31 | 69 | 35 | 155 | 51 | 41 | 11 | 18 |
| 1987 | 9 | 15 | 4 | 16 | 88 | 47 | 97 | 66 | 14 | 30 | 11 | 20 |
| 1990 | 21 | 19 | 2 | 19 | 24 | 107 | 134 | 122 | 34 | 42 | 3 | 78 |
| 1996 | 11 | 21 | 17 | 21 | 59 | 109 | 98 | 95 | 85 | 29 | 2 | 13 |
| Mean | 13 | 15 | 20 | 38 | 58 | 75 | 78 | 67 | 49 | 35 | 22 | 18 |

compared with southern Eyre Peninsula.

Cape Barren Goose management in South Australia is now moving into a more active phase following the significant recovery of goose populations from their lows in the 1950s (Robinson, Delroy and Jenkins 1982). The six episodes of monitoring of this population spread over 23 years and documented in this series of papers (Robinson, Delroy and Jenkins 1982; Robinson and Delroy 1986; Delroy, Robinson and Waterman 1989; and Robinson, De Groot and Fraser 1995) provide a significant baseline

against which to measure future population change.

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