



Burrow occupancy of broad-billed prions *Pachyptila vittata* on South East (Rangatira) Island, Chatham Islands, New Zealand

N. W. Was and K-J. Wilson

Ecology and Entomology Group,
PO Box 84, Lincoln University
Canterbury, New Zealand

Prepared for: Wellington Conservancy, Department of Conservation



**Lincoln University
Wildlife Management Report**

No.19

Lincoln University Wildlife Management Report 19

**BURROW OCCUPANCY OF BROAD-BILLED PRIONS
PACHYPTILA VITTATA ON SOUTH EAST
(RANGATIRA) ISLAND, CHATHAM ISLANDS,
NEW ZEALAND**

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Ecology and Entomology Group, PO Box 84, Lincoln University

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1998

ABSTRACT

Competition for breeding burrows between broad-billed prions (*Pachyptila vittata*) and other small burrowing seabirds on South East (Rangatira) Island, Chatham Islands, New Zealand is intense. This competition has a negative impact on the endangered Chatham petrel (*Pterodroma axillaris*) population. Competition is occurring in the broad-billed prion non-breeding season, a stage in the prion life cycle that we know nothing about. This study investigated the non-breeding period of a broad-billed prions life cycle on South East Island, information imperative to guide management decisions for future control or manipulation of the species. Seventy-seven broad-billed prion burrows were monitored nightly during parts of the 1996 and 1997 breeding seasons and the 1997 and 1998 non-breeding seasons to determine how often and which prions were using burrows. Of the 401 broad-billed prions recorded in study burrows the majority (up to 76%) were not resighted in any subsequent season. Of prions using the same burrow over consecutive years, the greatest number were recaptured in the non-breeding season following the breeding season they had visited a burrow. Marginally fewer prions were recaptured in the non-breeding season following the non-breeding season they had visited a burrow. Up to 10 broad-billed prions were recorded in individual burrows during the non-breeding season. A small number of broad-billed prions were recorded in more than one burrow. The majority of these multiple burrow visitors were found in burrows less than 5 metres away from the one they were banded in, but 24% were found in more distant burrows, a maximum of 100 metres away from the original banding point. Blockading, to prevent broad-billed prions from using selected burrows, lowered the use of these burrows in the subsequent non-breeding season. Broad-billed prion presence on South East Island was lower in the second year than in the first year of this study. It is suggested that broad-billed prion occupation of South East Island may have been affected by El Nino-southern oscillation weather patterns in the second year of study.

INTRODUCTION

South East Island is the major breeding location for broad-billed prions (*Pachyptila vittata*). The island provides habitat for many sea birds, including the endangered Chatham petrel (*Pterodroma axillaris*). Burrow competition with broad-billed prions is believed to be the major cause of decline in Chatham petrel numbers (West 1994). Broad-billed prions return to South East (Rangatira) Island in their non-breeding season to occupy burrows at the time Chatham petrels leave their young chicks unattended. Broad-billed prions oust Chatham petrel chicks from their burrows, or kill

chicks, and use these burrows themselves. Consequently, the survival of Chatham petrel chicks is dangerously low.

Broad-billed prions nest at low latitude close to the sub tropical convergence. They breed only in the New Zealand region and are found along the shores of Foveaux Strait (Oliver 1955; Richdale 1965; Powlesland 1989), on islands around Stewart Island (Oliver 1955), the Snares Islands (Harper 1980) and the Chatham Islands (Fleming 1939). They are a highly social species usually seen at sea in large flocks. On land they are sedentary and are only absent from their breeding colony for just six weeks of the year, immediately following their breeding season, during their moult (Warham 1990). The reasons they visit their colony outside the breeding season are not understood. No species of prion is endangered today, and those with small populations are generally protected by the remote and inaccessible nature of their breeding places (Warham 1990).

Broad-billed prions visit their nests erratically during the non-breeding season (Warham 1990). They are one of few petrel species that visit their breeding colony in their non-breeding period. There have been numerous studies on the breeding biology of petrels, but few on the non-breeding period of any petrels lifecycle, and none on the non-breeding cycle of broad-billed prions. Therefore, burrow competition with Chatham petrels is occurring at a stage in the prion cycle that we know nothing about.

This study investigated the non-breeding period of the broad-billed prions lifecycle on South East Island, information imperative to guide management decisions for future control or manipulation of the species. Further study by Wendy Sullivan and Kerry-Jayne Wilson will use the basic biological information obtained from this study and explore management options to alleviate competition between the two species.

The objectives of this study were to;

1. Study burrow use patterns of broad-billed prions in both the breeding and non-breeding seasons on South East Island.
2. To establish whether, a) broad-billed prions return to burrows used in a previous year or, b) they prospect for a vacant or Chatham petrel burrow in their non-breeding occupancy period.

3. To determine whether blockading broad-billed prions out of a burrow they bred in, in the previous breeding season, will deter them from returning to that same burrow in the following non-breeding season.

STUDY SITE

The Chatham Islands lie abreast of the sub - tropical convergence at 44 ° S, 177 ° W, some 870 kilometres east of New Zealand (Figure 1).

For a short time in the middle of last century South East Island was a shore base for whaling. Sheep were first introduced in 1880, virtually all were destroyed by March 1959 and the stragglers were shot in November 1961 (Wardle 1991). Grazing of livestock led to the replacement of most of the bush and tree-heath by grass and fern.

Since this time there has been a major regrowth of vegetation on the island. Tree regeneration under intact canopies has been spectacular. *Plagianthus* on South East Island has responded vigorously to the destocking that took place in the early 1960's (Wardle 1991). While much of the forest is regenerating, we suspect that the original species composition has undergone change (pers. comm. Kerry-Jayne Wilson).

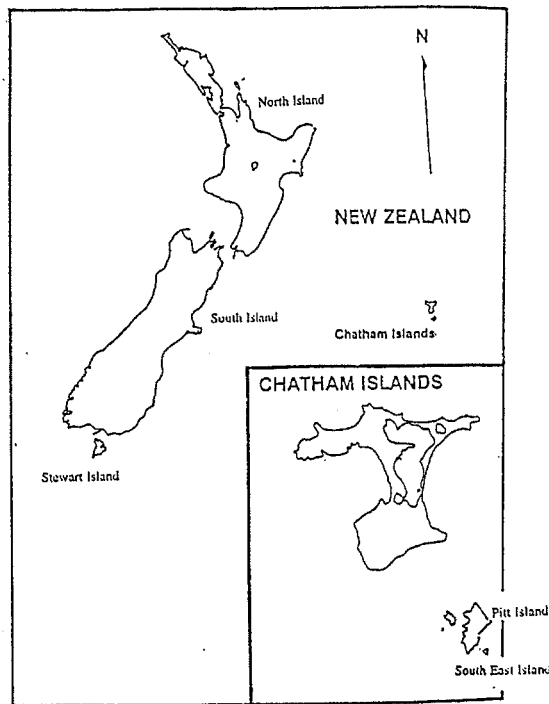


Figure 1: Location of the Chatham Islands in relation to New Zealand and South East Island in relation to Main Chatham Island

Due to the large number of broad-billed prions on South East Island it was possible to choose easily accessible study sites. The sites were located in five areas: near the hut; in woolshed bush on the summit track, the whalers bay track and in the remains of the old woolshed; and near Kokopu swamp (Figure 2). Four out of the five sites were located in the low, coastal areas alongside frequently used tracks close to the hut. The one exception was the Kokopu swamp site which was chosen because of the high density of Chatham petrels in that area.

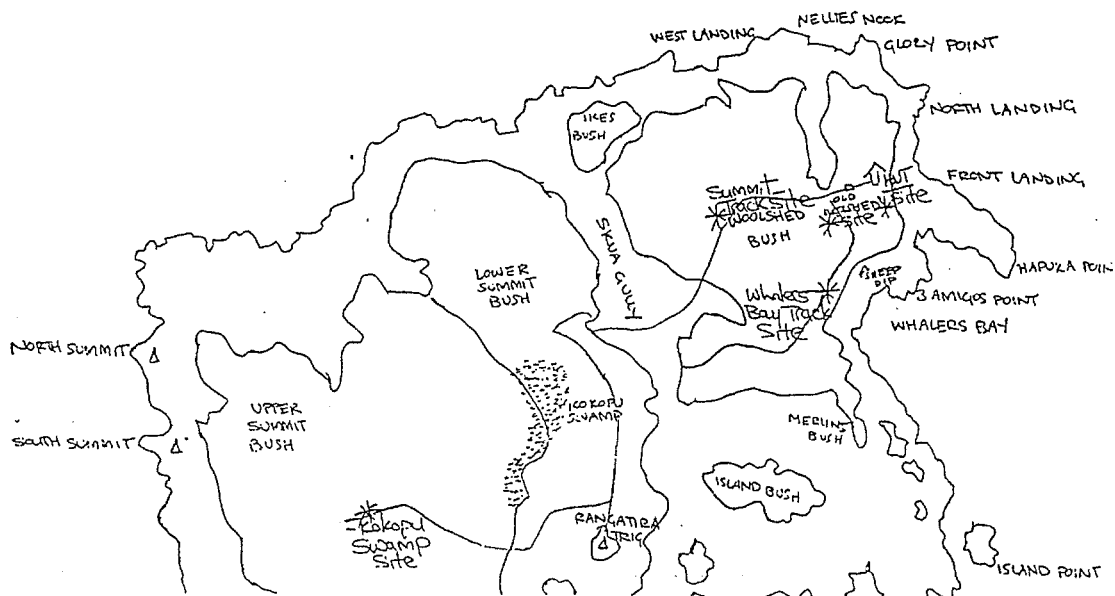


Figure 2: Location of study sites on South East Island, study sites are indicated with an *

METHODS

Data were collected during six visits to South East Island; 1) 06 February - 01 March 1996 (non-breeding season - NB); 2) 04 December - 18 December 1996 (breeding season - BR); 3) 14 February - 14 April 1997 (non-breeding season); 4) 1-October - 5 October 1997 and 5) 26 October - 11 December (breeding season); 6) 13 March 1998 - 01 May 1998 (non-breeding season)

Burrow occupancy

Study burrows were restricted to those with a tunnel short enough that the hand of the field worker could touch the back of the chamber. This was necessary to enable the field worker to remove the prion for banding with only minimal alteration to the burrow. In the 1996 non-breeding season

adult broad-billed prions found in 34 burrows (68 individuals) were banded. In the 1996 breeding season 77 burrows were selected for further study, this number included any of the original burrows that contained a chick and additional burrows that contained chicks. All birds associating with these burrows were banded.

Sixty-four of these burrows were fitted with artificial nest chambers which consisted of a 16 litre plastic bucket fitted with a 105mm diameter novapipe tunnel. The plastic bucket was modified by drilling 12 random holes around the sides of the bucket and removing all but a lip of plastic its base. The random holes reduced condensation in the burrows. Chicks were removed from their burrows while excavation and the placement of the artificial burrow took place. Plant matter and soil was returned to the burrow after the placement of this artificial burrow and chicks were then returned. An inverted plastic plant saucer was used as a burrow lid. Use of this lid allowed the observer to identify adults with minimal disruption to both chick and adult.

Broad-billed prion study burrows were monitored nightly throughout visits to the island to determine burrow occupancy. Initially, occupancy was also monitored daily to ensure that the same prions were using burrows by day as were by night.

Every broad-billed prion found in a study burrow was banded and each time the burrows were checked the band number of any prion present was recorded. In the early stages of Autumn 1997 field season prions were head-marked to assist behavioural work, but this proved ineffective and was discontinued.

Study burrow inspection protocols differed for the six different field seasons. In February 1996 burrows were inspected only during the last week of the field season and once two birds in any burrow had been banded that burrow was no longer inspected. In December 1996 both the burrows established in February 1996 and new burrows were inspected up to four times per night for the first seventeen days. For five days of the December 1996 field season, traps were set in the novapipe tunnel entrances and these were checked two times per night. The use of traps was discontinued in future seasons as it was felt that they might affect the use of burrows by both breeding and non-breeding birds. Between 1 October and 5 October 1997, all broad-billed prion study burrows were

visited once and bird occupancy recorded. In the remaining field seasons, burrows were checked once per night.

Blockading of broad-billed prion burrows

Fourteen broad-billed prion study burrows in the lower Woolshed Bush were blockaded in May 1997. Blockades used were identical to those used to blockade Chatham petrel burrows. Blockading took place at the same time as Chatham petrel burrows are customarily blockaded. Burrows selected were located close to other study burrows to maximise the chance that broad-billed prions would attempt to take over a new study burrow. The Kokopu swamp site was not used for testing, due to the potential for increased competition for the nearby with Chatham petrel burrows. Blockades were removed March 1998.

RESULTS

The majority of adult broad-billed prions (up to 76%) were never resighted either in the burrow they were banded in, or in any other study burrow. Of those that were resighted, marginally more birds (43%) revisited a burrow they had visited in the previous breeding season than in the previous non-breeding season (41%). A small percentage of birds were found in either a different burrow or in several burrows including the one in which they were banded (Table 1)

Table 1: Number of adult broad-billed prions present in one season (non-breeding - NB and breeding BR) and resighted in a subsequent season (1996, 1997 and 1998 data are combined).

SEASONS	SAME BURROW (%)	NOT RESIGHTED(%)	DIFFERENT BURROW (%)	MULTIPLE BURROWS (%)	Number of birds
NB-NB	41	76	5.8	4	120
NB-BR	29	68	3.3	0	151.1
BR-BR	22	73	4.7	0	85
BR-NB	43	47	4.4	6	74.6

During the 1997 and 1998 non-breeding seasons most of the study burrows were used by 2 - 4 broad-billed prions, with one burrow being visited by 10 birds (Table 2). More birds were recorded in burrows in the non-breeding season than the breeding season. However birds, in addition to the breeding pair, also visited burrows during the breeding season (Appendix 1).

Table 2: Total number of broad-billed prions recorded in study burrows 1997 / 1998 non-breeding (NB) seasons and the 1997 / 1998 breeding (BR) seasons.

No. of birds	Number of burrows with 1 - 10 birds recovered									
	1	2	3	4	5	6	7	8	9	10
NB season 1997	5	14	12	17	9	1	3	6	2	1
NB season 1998	3	21	7	5	2	1				
BR season 1996	17	26	21	3						
BR season 1997	19	16	5							

The two birds that visited a study burrow most frequently during the non-breeding season are termed burrow ‘owners’. Any other birds that visited a study burrow are termed ‘visitors’. The majority of visitors were recorded in a burrow only once (72%). There were some visiting birds that were recorded in a burrow up to 10 times (Figure 3a and b).

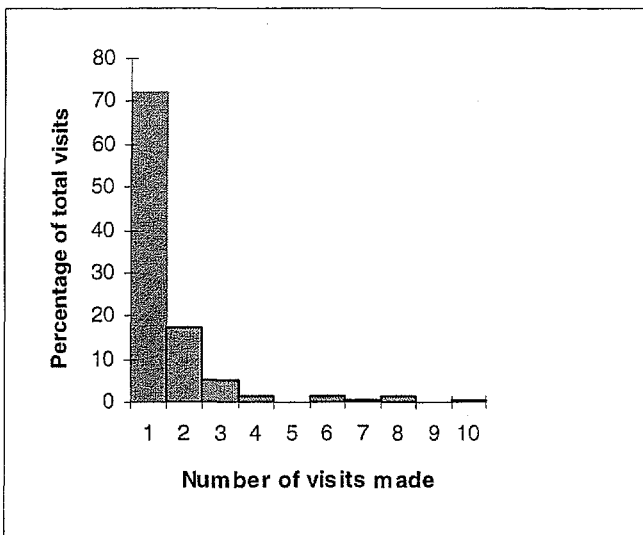


Figure 3a :number of times broad-billed prions visited burrows in the non-breeding season (1997).

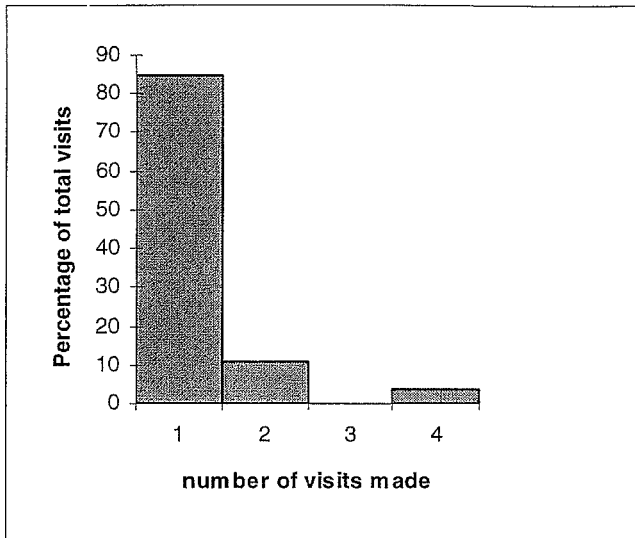


Figure 3b :Number of times broad-billed prions visited burrows in the non-breeding season (1998).

Visitation of multiple burrows by study prions

Fifty broad-billed prions were recorded in two, six in three, and one in four of the study burrows. In most cases prions changed burrows between seasons (56%). Some prions were recorded in more than one burrow within a single season (28%), and some individuals moved between burrows both within a season and between seasons (16%). Of the individuals that visited more than one burrow, 57% were found in burrows less than 5 metres from the one in which they were originally banded (Table 3). A number of broad-billed prions (24%) were found in different study sites (Figure 2) areas up to 100 metres away from the original banding point (Table 3). Twenty-three (40%) of the birds recorded in multiple burrows were breeders, whilst thirty-four (60%) had no known breeding history. Most changes in burrows used took place in the non breeding season (60%), the remainder between the breeding and non-breeding season (40%). Of the 57 individuals that were recorded in more than one study burrow, only two were initially recorded in the non-breeding season and then recorded in a different burrow in the subsequent breeding season.

Table 3. Number of adult broad-billed prions found in burrows other than that in which they were originally banded, the distance between the two burrows used by those birds and whether burrows used were found within the original banding site or in a different site.

< 2 metres	< 2 - 5 metres	> 5 metres within site	Between study sites
20	13	8	14

Blockading

Blockading of broad-billed prion burrows during a breeding season reduced burrow use in the subsequent non-breeding season.

Table 4. Number of broad-billed prions that were found in burrows that had been blockaded in the previous breeding season and the number of broad-billed prions that were found in burrows that had never been blockaded.

	Blockade Removed (%)	Number of birds	Never Blockaded (%)	Number of birds
Burrow Used	36	5	61	39
Burrow Not Used	64	9	38	24

DISCUSSION

Broad-billed prions are a very successful native species whose limiting resource on South East Island appears to be burrows. Burrow competition between broad-billed prions and Chatham and other petrels is complex. Richdale (1965) noted that established broad-billed prion breeders nest annually, often in the same burrow and with the same partners as in the previous year, defending their burrows vigorously from other prions. The presence of broad-billed prions on South East Island is erratic in their non-breeding season. In the non-breeding season the burrows of established breeders are often visited by prions with no known breeding history. Broad-billed prions breed earlier than the other species nesting on South East Island, occupy the island in their non-breeding season (Marchant and Higgins 1991) and are much more numerous than Chatham petrels. These three factors give them three advantages over Chatham petrels, and two advantages over other petrels on the island.

Individual broad-billed prions were ashore only at irregular intervals. There would be periods where the island was nearly deserted of prions, followed by nights where very large number of broad-billed prions were present. Numbers of broad-billed prions were much lower in the 1997 breeding and 1998 non-breeding season than in the earlier 1996 and 1997 seasons. The second year of this study coincided with El Nino -Southern Oscillation weather patterns and we suggest that this may have influenced broad-billed prion numbers in the 1997 breeding and 1998 non-breeding seasons.

Burrow Use Patterns

During their non-breeding season broad-billed prions attempt to dig new burrows, and / or take over existing burrows, whether these be Chatham petrel, broad-billed prion or burrows occupied by other species such as white-faced storm petrel (*Pelagodroma marina maoriana*) and common diving petrel (*Pelacanoides u. urinatrix*). The results of this study indicate that at least 43% but by no means all broad-billed prions recorded in a breeding season, returned to their burrows in the following non-breeding season. In addition to these established breeders, up to eight other birds were recorded visiting burrows that had been occupied earlier in the summer by breeding birds (Table 2). This multiple occupancy is indicative of significant pressure on available burrows, with burrows apparently being a significant limiting resource for the broad-billed prions of South East Island.

Only 22% of birds recorded in a breeding season, were recaptured in the burrow they had bred in, during the following breeding season. Richdale studied four petrel species while on Whero Island, a densely burrowed island (Richdale 1965). His data showed that repeated use of the same burrow by the same bird was **not** usual, contrary to the general view held about burrowing petrels (Warham 1990). Over the four seasons of Richdale's study fewer birds were recaptured each season, season one (87%) to season four (26%). It seems likely that eventually all would have moved.

The number of birds recaptured in the 1997 breeding season (54) was low compared to the 1996 breeding season (85). Once chicks have hatched, adults spend the majority of their time searching for food. While breeding birds occasionally remain in their burrow throughout the night and following day, the majority return only at night to feed their chicks. Adult birds only visit burrows for short lengths of time in the breeding season and mistiming of burrow checks could result in missing birds. It is possible to use traps in the artificial burrows to ensure any birds that enter will remain until their visit has been recorded. Traps were not used in this study after initial banding in December 1996 as it was felt that the trauma of being forced to remain in the burrow might drive breeding birds away and bias results. Traps would also potentially interfere with visitation by non-breeding birds.

Visiting of multiple burrows

The likelihood of catching broad-billed prions banded in one study burrow in another study burrow was expected to be low as there were numerous other broad-billed prion burrows close by that could be visited. However, fourteen percent of the birds in this study were found in two or more study burrows. This indicates the frequency of visiting multiple burrows may in fact be higher in the 'real' population than in the 'study' population. Approximately 5.5% were found in burrows more than 5 metres from where they were originally banded. Richdale's data indicates shifts of a maximum of 2.75 metres for diving petrels, white faced storm petrels and fairy prions. This distance is significantly less than indicated by this study. It has been suggested that broad-billed prions keep to their own particular part of the breeding island (Richdale 1965). Results from this study indicate that this is not always the case. One previously banded breeding pair recaptured in this study was found, with their pair bond still intact, in two distinct banding areas more than 60 metres apart. Warham (1990) recorded that shifts in burrows can occur in some petrel *sp.* without the pair bond being broken. Four birds originally banded in the vicinity of the Whalers Bay and Summit tracks were recaptured in the 'hut' study area (Figure 2).

It is unlikely that shifts occurred in this study because of collapse of burrows or the destruction of entrances as 65 of the 77 burrows observed were artificial. Some of the natural study burrows did collapse. It is possible that shifts occurred because broad-billed prions were unable to tolerate the artificial burrows, however this seems unlikely as on average up to 44% of birds returned. Assuming the rate of visitation between burrows in the total population is similar to that in our study population, localised culling of prions would be rendered ineffective as a management tool.

Blockading of burrows as a management technique

Burrow blockading has been used in management of Chatham petrels in past years in an attempt to break the bond that prospecting broad-billed prions might make while occupying Chatham petrel burrows during the prion non-breeding season. Blockading takes place in May when fences are erected in front of burrow entrances preventing entry but prospecting birds. The breeding history of birds excluded from these burrows has not been determined. This study investigated the effectiveness of blockading study burrows in which broad-billed prions had successfully bred in the

previous season (1996). Burrow blockading appeared to reduce use by broad-billed prions returning in their non-breeding season. The number of burrows used that were not blockaded was higher in the 1998 non-breeding season (61%) than burrows that had been blockaded during the 1997 breeding season and were unblockaded for the 1998 non-breeding season (36%). However the sample size of blockaded burrows was small (14). It is possible that the effects of blockading would be greater in this study as breeding birds were affected, while birds prevented from using Chatham petrel burrows may in many cases have been casual prospectors or visitors. Future experimentation with burrow blockading is suggested.

This study has taken place to provide information about the breeding biology of broad-billed prions on South East Island to support management decisions. We suggest there are three possible burrow use scenarios with corresponding management implications.

1. **Breeding burrows are only being used by breeding adults.** This scenario would suggest a stable and easily managed population. If this scenario was correct management could involve removing broad-billed prions from burrows surrounding known Chatham petrel burrows. We would expect a lasting reduction in broad-billed prion density in these areas.

2. **Broad-billed prions do not establish ownership of burrows and will return to any burrow available.** This is an undesirable scenario. There would be no stability in the population. The removal of broad-billed prions will achieve little, if anything, as it is likely that as soon as a prion is culled, another will occupy the burrow.

3. **Breeding adults will return to their established breeding burrows and non-breeding birds will also prospect and attempt to establish themselves in these burrows.** This scenario would also be undesirable. Management could involve culling the breeding adults and then culling the other prions visiting the burrows. It is possible that removing the stable part of the population and creating the vacuum described in scenario two will merely exacerbate the existing problem.

Our data suggests that on South East Island we have a variation of scenario three. Established breeding prions are returning to their burrows and both non-breeding and breeding birds are visiting and apparently attempting to establish 'ownership' of these burrows. With the intense competition

for burrows, the culling of broad-billed prions in the vicinity of Chatham petrel burrows is likely to create a low density area which will take, but days, to fill with further unattached broad-billed prions. Consequently management by culling broad-billed prions in burrows surrounding Chatham petrel burrows is likely to achieve little in the medium to long term but could result in short term reduction in interference. Removing broad-billed prions from Chatham petrel burrows that are currently used by the petrels, will help the Chatham petrel population in the short term by; a) giving chicks the opportunity to fledge, and b) allowing maximum opportunity for Chatham petrels to return to burrows they have previously established themselves in.

Keeping the twenty broad-billed prion burrows closest to a Chatham petrel burrow free of broad-billed prions will involve night by night controlling. This type of management will be twenty times as intensive as the current method of culling any broad-billed prions found in a Chatham petrel burrow. Broad-billed prions will have to be culled in twenty as opposed to the single burrows they have been culled in, in the past.

CONCLUSION

Burrow competition between broad-billed prions, and between broad-billed prions and other petrels is intense. Up to 76 % of broad-billed prions banded in study burrows were never resighted. Up to 10 broad-billed prions were recorded in the same burrows during the non-breeding season. Of those broad-billed prions that visited more than one study burrow 24% were found in study areas up to 100 metres from where they were originally banded. All these factors are indicative of a very mobile population where burrows competition is intense. For the benefit of all small burrowing petrels on South East Island, but particularly for the endangered Chatham petrel, we need to reduce the density of broad-billed prions in localised areas on the island. Large scale culling is not a justifiable option as there are too many broad-billed prions present and both the breeding and non-breeding population appear to be mobile with individuals using more than one burrow. It is necessary to manage the Chatham petrel population in order to allow numbers to increase to a level allowing the possibility of translocation or other future management possibilities. To achieve this reduction in interference by prions is necessary.

We recommend the following **short term** management techniques;

1. Continue blockading Chatham petrel burrows after their breeding season to prevent broad-billed prions from establishing a bond with these burrows, and to ensure these burrows are available to Chatham petrels when they return to commence breeding.
2. Cull broad-billed prions that enter Chatham petrel burrows until a suitable management techniques are developed to prevent prions from entering Chatham petrel burrows.

Suggested further research;

1. Further development of the burrow flap designed to discourage broad-billed prions from entering Chatham petrel burrows, trialed by Kerry-Jayne Wilson and Wendy Sullivan in 1998.
2. Development of the electronic gate device suggested by Philippa Gardener, currently being developed by the Department of Conservation.
3. Detailed study of habitat use and behaviour of broad-billed prions in the vicinity of Chatham petrel burrows to be done by Wendy Sullivan in 1998.
4. Investigation of broad-scale and micro-scale habitat preferences of both prions and petrels to be done by Wendy Sullivan in 1998.

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ACKNOWLEDGMENTS

Without funding from the Department of Conservation this project would not have been able to go ahead. The department is thanked for this opportunity. A special thankyou to staff from the Chatham Island Department of Conservation Field Centre who were very helpful for a multitude of small logistical problems. We greatly appreciated the help of all those people who spent time in the field on South East Island, at all hours of the night, looking for broad-billed prions. A special thanks to Philippa Gardener, Mike Bell, Fiona Bancroft, Richard Griffiths, Lyndon Perryman, Denise Fastia, for their help with the study. A thankyou also to all those people who were such wonderful company on the island throughout the field seasons. We would like to acknowledge the help of Barbara Brown with the production of this report.

NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
106039	3											
106040	3											
106041	32											
106042	32											
106043	30			106043	29	1						
106044	30			106044	29	1						
106045	29			106045	29	1						
106046	33											
106047	28	106047	28	106047	28	8						
106048	28	106048	28	106048	28	6						
115501	34	115501	45	115501	45	18						
115505	35			115505	35	12				115505	45	4
				115505	45	2						
115506	35			115506	35	8				115506	45	3
										115506	46	1
115508	44											
115509	43			115509	45	1						
115510	20			115510	20	12						
115511	22			115511	22	2						
115512	36									115512	10	1
115513	8											
115514	9			115514	9	8				115514	10	17
115515	43											
115516	16			115516	16	2						
115517	37											
115518	37											
115519	38											
155520	38											
163256	2											
163258	7											
163259	8			163259	8	16	163259	8	8	163259	8	6
							167259	8	1			
163261	15						163261	15	1	163261	15	2

APPENDIX 1 : Burrow occupancy data of broad-billed prions on South East Island for non-breeding season 1996 through to non-breeding season 1998.

Sheet1

NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
163263	15			163263	15	2	163263	15	2	163263	15	4
163264	13						163264	13	4			
163267	12			163267	57	1						
163269	wlshd			163269	1	3						
163271	3											
163273	9			163273	9	8	163273	9	10	163273	9	1
										163273	10	1
163274	10											
163275	10											
163276	18											
163277	16			163277	16	1						
163279	17											
163281	14											
163282	11			163282	46	1						
163283	11											
163287	2											
163288	2			163288	35	11						
				163288	45	2						
163289	21			163289	19	1						
				163289	20	1						
				163289	21	1						
163290	22			163290	22	2						
163291	23	163291	23	163291	23	2	163291	23	1			
							163291	23	6			
163292	23			163292	23	1						
163293	20	163293	20	163293	20	1						
163294	19											
163295	25											
163296	26			163296	26	1						
163297	24											
163298	28											
				167261	15	1						
				167275	10	1						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
		167301	45	167301	45	10						
		167302	73	167302	73	4	167302	73	1			
		167303	62	167303	55	2	167303	16	8			
				167303	62	2						
		167314	66	167314	66	4						
		167315	69									
		167316	68							167316	68	1
		167317	66									
		167318	67	167318	53	3	167318	67	3			
				167318	66	1						
				167318	67	10						
		167319	21	167319	21	2	167319	21	1	167319	20	1
				167319	21	2				167319	21	1
		167320	50	167320	50	6	167320	50	1	167320	50	4
		167321	59	167321	59	7						
		167322	56				167322	56	1			
		167323	47	167323	47	2	167323	47	8			
		167324	45	167324	46	13	167324	46	3	167324	46	7
		167325	19	167325	19	18						
				167325	21	1						
		167326	63									
		167327	65	167327	65	4						
		167328	70	167328	70	2						
		167329	75	167329	75	9	167329	75	1	167329	75	4
		167330	64									
		167331	48	167331	48	4	167331	48	1			
		167332	52	167332	52	5						
		167333	51	167333	51	1						
				167333	52	4						
		167334	52	167334	51	14						
		167335	45	167335	58	5	167335	58	2			
		167335	58									
		167336	19	167336	19	10						
				167336	51	1						
		167337	70	167337	70	1						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
		167338	61	167338	61	1						
		167339	53									
		167340	77							167340	19	1
		167341	58	167341	58	6	167341	58	10	167341	58	3
		167342	59	167342	59	19						
		167343	78	167343	78	2						
		167344	79	167344	79	3				167344	79	5
		167345	54	167345	53	5						
		167346	71	167346	71	17						
		167347	52	167347	51	1						
		167348	555	167348	55	1						
		167349	74	167349	74	2						
		167366	80	167366	80	3						
		167367	81									
		167371	62	167371	62	3				167371	61	1
										167371	62	1
		167372	21	167372	21	5	167372	21	2	167372	20	6
							167372	21	1	167372	21	5
		167373	76									
		167380	89	167380	89	7	167380	89	4			
		167381	97	167381	97	6						
		167386	84	167386	84	14	167386	84	1			
		167387	84	167387	84	1	167387	87	1			
		167388	89	167388	89	1	167388	89	1			
		167389	82	167389	82	2						
		167390	86	167390	86	8						
		167396	92	167396	90	2						
		167397	91									
		167398	99	167398	99	3						
		167399	48	167399	48	18						
		167400	80	167400	80	6						
		167401	49	167401	49	10				167401	48	2
		167402	67	167402	67	8	167402	67	1	167402	67	3
		167402	74									
		167403	93	167403	93	8				167403	93	1

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
		167404	98	167404	98	11						
		167405	74	167405	74	3						
		167406	77	167406	77	11						
		167407	63									
		167408	95	167408	95	3						
		167409	35	167409	35	8						
		167410	96									
		167411	78	167411	78	5						
		167412	71	167412	71	11						
		167413	75	167413	75	4	167413	75	1	167413	75	5
		167414	10	167414	10	15	167414	10	4	167414	10	15
		167415	96									
		167416	95	167416	88	1						
				167416	95	2						
		167417	88									
		167418	51	167418	51	13						
				167418	75	1						
		167419	77	167419	71	1						
				167419	77	8						
		167420	97	167420	97	1						
		167421	92	167421	92	6						
		167439	85	167439	85	2	167439	85	3	167439	85	2
		167440	88	167440	88	3						
		167441	83	167441	83	3						
							167442	82	3	167442	82	2
							167443	77	2	167443	77	4
							167444	75	1			
							167445	19	1			
							167445	19	4			
		167451 f										
		167452 c										
		167453	60	167453	60	9	167453	60	1	167453	60	6
				167455 f		1						
				167456	50	2						
				167456	56	1						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				167457	10	1						
				167458	19	3						
				167458	20	1						
				167458	77	1						
				167459	19	3						
				167460	97	3						
				167461	93	3						
				167462	95	2						
				167463	95	2						
				167464	85	2						
				167465	84	1						
				167465	85	2						
				167466	84	1						
				167467	8	1						
				167468	48	1				167468	49	1
				167468	49	14						
				167469	97	1						
				167470	97	2						
				167471	67	2						
				167471	92	5						
				167472	99	1						
				167473	8	1				167473	8	4
				167474	70	1						
				167475	98	2						
				167476	98	1						
				167477	97	1						
				167478	67	1						
				167478	68	7						
				167479	85	11	167479	85	1	167479	85	4
				167480	51	2						
				167480	52	1						
				167481	21	1						
				167481	23	1						
				167482	73	5						
				167483	92	1						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				167485	66	1						
				167486	67	2						
				167487	6	1						
				167488	95	3						
				167489	96	1						
				167490	96	1						
				167501	62	1						
				167502	60	1						
				167503	56	9	167503	56	2	167503	56	2
				167504	47	8	167504	47	2	167504	47	6
				167507	67	1				167507	67	2
				167507	68	3						
				167513	77	1						
				167514	10	1						
				167518	94	1						
				167520	49	1				167520	50	1
				167522	8	1	167522	75	5	167522	70	1
				167524	whalers	1				167524	46	1
				167529	75	1						
				167530	49	13						
				167533	57	1						
				167534	53	2						
				167537	72	5						
				167539	79	3				167539	79	3
				167540	20	6				167540	19	10
				167540	22	1						
				167541	74	1						
				167542	8	7				167542	8	1
				167543	93	1						
				167543	92	1						
				167544	94	1						
				167545	97	1						
				167546	66	1						
				167547	75	1						
				167549	8	2						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				167549	93	12						
				167550	97	3						
				167551	72	7	167551	72	3	167551	72	6
				167552	52	2						
				167553	61	1						
				167554	62	2						
				167555	86	6	167555	86	1	167555	86	1
				167556	10	15	167556	10	3			
				167557	62	1						
				167558	87	1						
				167559	87	2				167559	86	1
				167560	89	1						
				167561	8	4						
				167562	46	7						
				167563	60	14	167563	60	2	167563	60	7
				167564	62	3						
				167565	99	1						
				167566	20	1						
				167567	47	1						
				167568	8	6						
				167569	46	1						
				167569	65	4						
				167570	88	1						
				167571	98	9						
				167572	56	1						
				167572	57	2						
				167573	64	2						
				167574	9	6				167574	90	1
										167574	90	3
				167575	88	1						
				167575	90	3						
				167576	75	1						
				167577	75	1						
				167578	50	3						
				167578	68	1						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				167579	69	2						
				167580	69	3						
				167581	28	4						
				167582	66	3	167582	66	1			
				167583	68	1						
				167584	68	11				167584	68	8
				167585	90		167585	90	1	167585	90	3
				167586	1	1						
				167587	49	2				167587	49	2
				167588	94	3						
				167588	98	1						
				167589	76	7				167589	26	1
				167589	78	1				167589	76	3
				167590	19	2						
				167591	69	9						
				167592	46	7				167592	46	8
										167592	68	1
				167593	66	3						
				167594	66	1						
				167594	67	1						
				167595	19	2						
				167596	50	6	167596	50	1	167596	50	11
				167597	22	1				167597	67	8
				167598	29	1				167598	29	1
				167599	94	2						
				167600	68	1						
				167601	1	1						
				167602	23	1	167602	23	1			
							167602	23	1			
				167603	83	1						
				167604	26	1						
				167605	28	1						
				167606	30	1						
				167607	85	1						
				167608	76	5						

NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				167609	28	1						
				167610	727	1						
				167611	21	1						
				167614	82	1						
				167615	75	1						
				167616	51	1						
				167617	10	1				167617	9	1
										167617	46	2
				167618	72	2						
				167619	47	1	167619	21	1			
				167620	58	1						
				167621	72	1				167621	72	2
				167622	52	1						
				167623	66	1				167623	19	1
										167623	66	1
				167624	62	1						
				167625	62	1						
				167626	30	1						
				167627	78	1						
				167628	68	1	167628	68	1			
				167629	97	1						
				167630	a	2						
							169901	87	1	169901	87	5
							169902	92	1	169902	92	3
							169903	26	1	169903	26	2
										169903	96	1
							169904	26	1	169904	26	1
										169904	96	1
							169905	13	1			
							169906	9	1			
				166424	82	4						
				166425	86	1						
				166426	86	1						
				166428	89	3						
				166451	84	11						

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NB 1996	burrow	BR 1996	burrow	NB 1997	burrow	visits	BR 1997	burrow	visits	NB 1998	burrow	visits
				166452	87	8						
				166459	87	1						
				166469	87	1						
				166485	87	1						
				166492	82	1				166492	45	1
										166493	68	7
										166495	10	4
										170001	19	8
										170002	45	1
										170003	77	1
										170003	77	6
										170005	26	1
										170005	76	3
										170008	87	5
										170009	87	1
										170013	62	2
										170014	49	8
										170017	70	2
										170018	92	2
										170018	93	1
										170019	49	1
										170020	47	1
										170021	47	1
										170022	61	2
										170024	15	1
										170025	70	1
										170026	15	1
										170027	15	2
										170029	78	1
										170030	91	1
							143476	45	1			
										150022	61	1
										163110	wlshd	1
										167004	48	1
										167008	8	1