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Observations of Breeding Success in White-faced Storm-Petrel at a Newly Established Colony

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The establishment and decline of a breeding colony of White-faced Storm-Petrels *Pelagodroma marina* at Fisher Island in the Furneaux Islands, Tasmania was observed from 1973 to 1977.

An attempt was made to follow the success of breeding in the colony in its first years and also to gather information to compare this colony with long established colonies of the same species elsewhere.

The information collected showed that the breeding birds at Fisher Island were less faithful to their mates and nesting sites than was reported for this species by Richdale (1965).

Whilst working with D. L. Serventy on Short-tailed Shearwaters *Puffinus tenuirostris* at Fisher Island a unique opportunity to study a newly established petrel colony presented itself. White-faced Storm-Petrels *Pelagodroma marina* were regarded as occasional nocturnal visitors to Fisher Island, until November 1973 when first attempts by this species at colonising the island were made. The success of the colony was monitored through each season until total abandonment in 1977.

The storm-petrels that colonised Fisher Island are thought to have come from Spence's Reef, the nearest colony of this species to Fisher Island. Spence's Reef is 1.6 km south of Fisher Island and about 300 pairs of storm-petrels breed here, often concealed only by a mat of vegetation due to limited burrowing space. Within 0.5 km of Spence's Reef and 2.1 km from Fisher Island is another storm-petrel colony on Tucks Reef. The size of this colony is unknown but due to the small area of this reef it would not be greater than the Spence's Reef colony.

Fisher Island, (40° 10'S., 148° 16'E.) is a low, flat granite islet with an area of 0.8 ha

situated in Adelaide Bay at the southern end of Flinders Island, Tasmania. About 70 pairs of Short-tailed Shearwaters breed on the island. A more detailed description of the avifauna of the island is given by Serventy (1977).

Methods

In 1974, the first year of breeding, the island was searched daily for burrows, which when found were identified by a numbered red-marker post. Each burrow was checked daily and all storm-petrels found were banded with aluminium CSIRO bands*. Sexing, where possible, was done by cloacal examination. To minimise disturbance in 1975 burrows were checked on only three occasions. In the years when birds were not breeding the work involved general observations and regular searches for burrows only.

The results of this study were compared with Richdale's (1965) in New Zealand.

* Bands used were provided by the Australian Bird-banding Scheme, Division of Wildlife Research, CSIRO.

Results

1973

Six shallow burrows constructed in this year were not occupied during the day, and no eggs were laid. A total of 13 birds, one in a burrow, the rest on the surface, were found dead, scattered about the island during our visit of 28 November to 15 December. Death was attributed to predation by Black rats *Rattus rattus*.

The activities of the birds may have been only exploratory since in the following season most eggs had already been laid prior to our arrival.

1974

The island was visited again from 29 November to 17 December. It was found that 17 (68%) of the total of 25 eggs were laid prior to 1 December and the last on 14 December.

Although only 27 were permanently occupied, birds were found at one time or another in 50 burrows. Eggs were laid in 22 burrows but only six chicks were found in mid February and these had departed by early March.

One adult storm-petrel only was found dead in 1974. This was a bird that became stuck to a freshly painted nest marker on leaving its burrow.

1975

The number of burrows constructed increased from 50 in 1974 to 94 in 1975. A total of 64 eggs were laid, 57 in newly constructed burrows and seven in 1974 burrows. Of the 50 burrows present in 1974, 26 were again occupied, 12 were blocked and 12 not used.

Hatching success in the 1975 season is unknown but any chicks that may have hatched did not survive through to fledging.

Thirty-three adults were found dead during this visit of November to December, six of these being banded birds. Mortality during 1975 was attributed largely to a Water Rat *Hydromys chrysogaster*, which was eventually trapped on 5 December.

1976

The island was visited from November to December but detailed observations on storm-petrels were not made. However the number of birds present was considerably less than in the previous two seasons and very few of the burrows contained birds. No eggs were found. About 25 pairs of Silver Gulls *Larus novaehollandiae* nested on the island in 1976 but their colony was

separate to that of the storm-petrels and interference was thought to have been minimal.

1977

As with all previous years the island was visited from late November to mid-December and again in mid-February. No storm-petrels were observed during these visits and burrows had been left undisturbed. This year, between 100-150 pairs of gulls nested amongst the storm-petrel colony.

Arrivals and Departure Times

In 1973 first arrival of birds each night was at 21:50 hours (Tasmanian Summer Time) and peak activity occurred usually from 22:30 through 24:00 hours, declining gradually after 24:00 until 02:00 hours when all had departed. The number of storm-petrels present each night was similar, there often being 20 or more in the air at the one time, flying low over the island and occasionally landing amongst the tussock grass *Poa poiformis* only to depart if approached.

First arrivals in 1974 appeared between 22:00 and 22:30 hours building up in numbers rapidly between 22:30 and 23:00 hours by which time the majority appeared to have landed. Up to 10 birds were seen flying about at various times after this initial landing. During this period storm-petrels mainly flew over colony areas whereas in 1973 birds were flying and landing all over the island. Abruptly at 03:55 hours just prior to dawn, birds commenced leaving the island and were all gone within ten minutes. Apart from parent birds of the chicks still in burrows no other birds were seen during a five day visit in February 1975.

Habitat

On Fisher Island the most suitable areas for burrowing are occupied by Short-tailed Shearwaters and, despite sufficient space for burrowing being still available, storm-petrels appeared to avoid these areas.

Soil depth outside areas where shearwater burrows occur is very shallow which resulted in nest chambers of storm-petrel burrows being only about 10 cm below the surface. In some instances the roof of burrows consisted of vegetation roots only. The base of tussocks were used as nest sites on three occasions, and rock crevices on two.

As was to be expected of a newly established colony, and particularly one in such poor burrowing conditions, burrows were not very substantial. The average length was 30 cm with maximum length of just under one metre and minimum of 22 cm. With the exception of one burrow which forked into two tunnels, all were single tunnels generally straight or with curves to avoid solid obstacles.

Eggs were laid at the end of the burrow, usually in a well constructed nest of dry vegetation, this vegetation apparently being used by some birds to conceal eggs when left unattended.

Incubation

The average length of incubation shifts were calculated from Figure 1 by two different methods. Where birds changed shifts without the egg being left deserted, the length of these periods on the egg were considered to be normal incubation shifts. For females these periods varied from 3 to 5 days with a mean of 4.4 and for males from 3 to 6 days with a mean of 5.0 days.

The second method was to add the number of days a bird was present to the number of days the egg was abandoned by that bird until the arrival of its mate. Using this method the length of incubation shifts for females varied from 3 to 6 days with a mean of 5.1 and for males 4 to 9 days with a mean of 6.5. Combining figures from the two methods gives an average incubation shift time of 4.7 days for females and 5.7 days for males. This is very similar to that obtained by Richdale (1965) in New Zealand where the usual span was four or five days.

If an average incubation shift by a bird occurred and the mate of this bird did not appear, the days missed were attributed to the mate and if a bird sat for less than the average incubation shift time the number of days the nest was deserted following the bird are attributed to that bird. Working on these assumptions, it would appear that females are almost three times more inclined to desert eggs than males.

Storm-petrel eggs are capable of withstanding periods of desertion (Richdale 1965). The six eggs that did hatch were subject to periods of desertion, probably due to human interference. One egg was unattended for three continuous days, the others for only one or two. The eggs in two successful nests (Nos. 20 and 21), were unattended when first found.

It appeared that some pairs were naturally

inconsistent or inexperienced at incubation. When first found Burrow 6 contained an egg and six days passed before a bird commenced incubation. This bird completed an average five day shift but its mate did not appear for another four days. At Burrow 3, the female incubated her freshly laid egg for one day, after which the egg was not attended again. A similar situation occurred in Burrow 8, although the female did return eight days later when she sat for one night, missed a night, and returned again the next night only to depart again the following night.

Instances such as at Burrow 21 where a broken incubation shift occurred, causing that bird to return earlier than necessary are difficult to explain. It would thus appear that a change in incubation shifts will occur regardless of how long the bird has been sitting prior to its mate appearing. At the same time birds may return earlier if their last shift was shorter than normal.

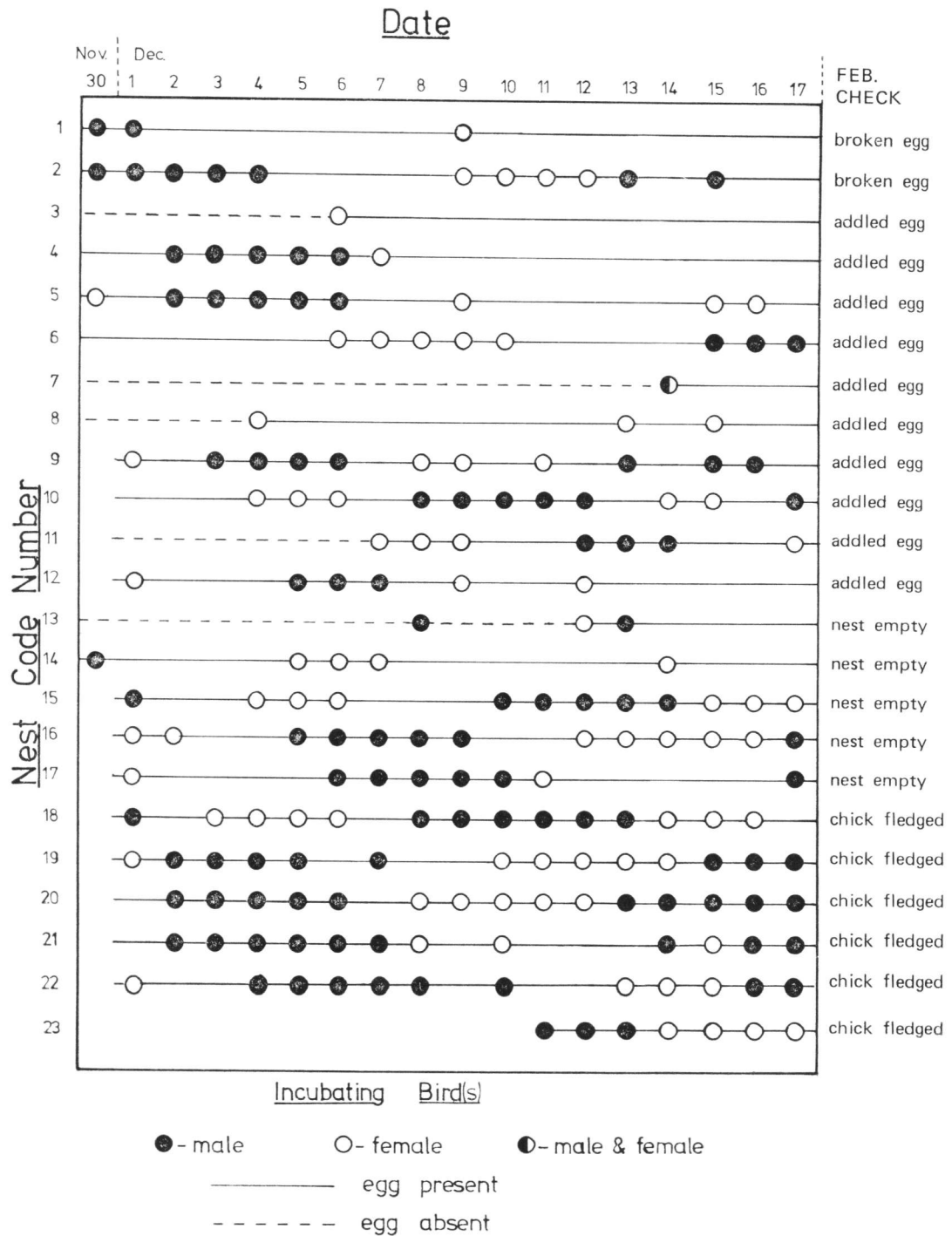
Three burrows contained two eggs. In two of the burrows only one of the two eggs was incubated while in the third both were incubated. However one was removed from the nest when found to be cracked and subsequently the other hatched.

The five instances where eggs were laid after commencement of burrow checking, the female stayed at least one day. Only the female was present in all nests at egg-laying with the exception of Nest 7 where both the female and male were present.

No information was obtained on hatching success, although it would appear that only six chicks hatched, (1974), since ten of the sixteen remaining eggs were still in burrows in mid-February and of the others, recorded incubation shifts were probably too irregular for eggs to have hatched. Two pairs had reasonably continuous incubation shifts and eggs may have hatched. If they did, the chicks must have died since they would have been too young to have fledged before the mid-February check.

Pair Bonds

In 1974, 22 pairs and seven single adults were banded and in 1975, 41 pairs and 21 single adults. Of the 51 adults banded in 1974, ten returned the following season but only three of these to the same burrow. One 1974 banded pair returned the following season but both birds had new mates. All the other birds that returned also had new mates.



• Figure 1. Incubation data for 23 White-faced Storm-Petrel nests on Fisher Island.

Discussion

The most interesting aspect of this study is why storm-petrels suddenly came to breed on Fisher Island, and why they failed.

A simple explanation as to why storm-petrels attempted to colonise is that neighbouring colonies became saturated, the birds on Fisher Island being the overflow from these colonies.

Gillham (1963) mentioned that at all storm-petrel colonies investigated in the Furneaux Group, Short-tailed Shearwaters were not present and interpreted this as being due to the inability of the two species to live side by side since they occupy the same ecological niche. Should this be the case it offers an explanation as to why the storm-petrels avoided utilising more suitable burrowing conditions, where shearwater colonies were established. The island's size may be altogether too small to allow both species to breed successfully.

Possible interference by Silver Gulls and predation by Water Rats and Black Rats may have been contributing factors to the colonies' failure. During 1974 regular human interference quite possibly was the cause of a certain amount of interrupted incubation and in some cases total desertion of nests.

The information obtained on various aspects of breeding, when compared with what Richdale (1965) found in New Zealand indicates that White-faced Storm-Petrels breeding in Australia have similar habits.

Data obtained on breeding success, burrow tenacity and pair bonds, at Fisher Island cannot be regarded as typical of storm-petrels. When compared with that of Richdale (1965) who recorded that a high percentage of birds retained the same burrow and also remained in pairs, they suggest that birds on Fisher Island, in fact were not behaving "normally".

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