DURATION OF IMMATURITY IN THE SHORT-TAILED SHEARWATER, *PUFFINUS TENUIROSTRIS* (TEMMINCK)

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Summary

Three marked individuals of the short-tailed shearwater, *Puffinus tenuirostris* (Temminck), first reproduced at 5, 6, and 7 years of age, respectively. Immature birds (pre-breeders) return to the islands on which they were reared at, usually, 3 years of age. These, and the 4-year old birds, visit the rookeries between January and mid March. The non-breeding 5, 6, and 7-year old birds arrive with the breeding adults in November and cease visiting the rookeries by mid January.

I. INTRODUCTION

In the breeding season of 1955–56 the first locally-bred banded individual of the short-tailed shearwater, *Puffinus tenuirostris* (Temminck), nested at Fisher Island in the Furneaux Group, Tas., at the age of 6 years (Serventy 1956). In the succeeding breeding season, 1956–57, further data have accumulated on the subject of age at first reproduction.

II. RESULTS AND DISCUSSION

No. 12012 (hatched in January 1950), which had bred in 1955–56, reproduced again in 1956–57, when two other individuals raised on Fisher Island bred for the first time. These were No. 10706, aged 7 years (hatched January 1950), and No. 15409, aged 5 years (hatched January 1952). All three were females and were mated to established males. Thus it is evident that some individuals of this species are capable of reproducing at 5 years of age, but further data are needed to show the modal age at first breeding, and whether any differences in this respect exist between the sexes.

During the 1956–57 season there were recorded at Fisher Island 19 other individuals aged 5, 6, or 7 years. These, however, were definitely unmated. They comprised eight 5-year old birds, nine 6-year olds, and two 7-year olds, and still belonged to the category of immature or prebreeding individuals to which Fisher (1952) refers as "prospectors".

In the case of the fulmar, *Fulmarus glacialis* (L.), Fisher divides an individual's life into three phases as follows: in the first x years of its life the young fulmar remains at sea, leading a sexless foraging life without coming ashore. In the next y years it developes an incubation patch and a drive to incubate during the nesting season, but, in spite of this and the fact that it starts to prospect nest sites ashore, it does not appear to able to lay or to fertilize an egg. The remaining z years of its

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life are devoted to annual breeding if circumstances allow. In the fulmar *x* and *y*, and also *z*, were believed to be lengthy periods. Though no evidence from banding was available, Fisher thought *x* might be 4 years in the fulmar and *y* 4 or 5 years.

Fisher's concept may readily be applied to the situation now becoming apparent in the short-tailed shearwater, as each season more and more histories of banded immature birds appearing at the rookeries are accumulating. Since monel metal banding was begun in March 1950, 40 birds banded as fledglings on Fisher Island have been recorded back on the island at various times up to January 1957.

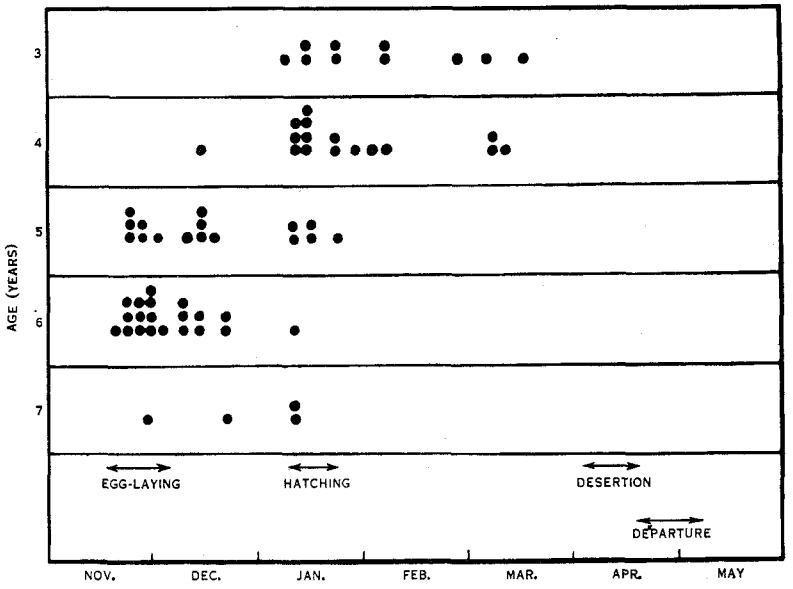

Fig. 1.—Occurrence ashore at Fisher Island of immature marked shearwaters of various year classes. Superimposed records from January 1953 to January 1957, each dot representing a single recording of an individual. Below is shown the duration of various phases of the species' nesting cycle—egg-laying, hatching, desertion by the parents, and departure of the fledglings.

None of them returned to the island before it was 3 years old. However, on one of the commercial mutton-birding islands in the Furneaux Group, Babel Island, two marked birds of 2 years of age were picked up. These records appear reliable but they cannot be guaranteed. To what extent shearwaters of phase *x* occur at sea in the vicinity of the breeding islands is unknown. During the breeding season some individuals of the species still linger in parts of the North Pacific and these would undoubtedly be *x*-birds. That some do share in the return migration towards the breeding grounds is demonstrated by the recovery (in late December and early January) of two banded first-year birds along the New South Wales coast, birds which had reached within 360 and 410 miles, respectively, of their natal islands before they perished (Serventy 1957).

In Figure 1 the times at which the 40 immature shearwaters of known age were encountered ashore at Fisher Island are set out diagrammatically in relation

to the phases of the adult's nesting cycle. It will be seen that birds of 3 and 4 years of age first appear in the colonies usually in January and cease their visits by mid March. It appears that only a proportion of the 3-year old birds comes ashore, some still remaining in the x-phase. Very many more of a particular year-group are first recorded at 4 than at 3 years of age, and in January 1957 no 3-year old birds at all were recorded on Fisher Island, though diligent search was made by Mr. N. E. Stewart. One 4-year bird was first taken on December 15 but this early date is exceptional.

A radical difference in behaviour is shown by birds aged 5 years or more. These come ashore with the breeding adults at egg-laying (after the adults' pre-laying exodus; Marshall and Serventy 1956), but whether they appear still earlier in the nesting cycle is as yet unknown. They continue to be recorded until about mid January, when the 3 and 4-year old birds begin to make their appearance at the islands. Observations have not yet been carried on long enough to show whether the 5 to 7-year olds really disappear from the islands at this time.

It remains to be shown whether we should consider the non-breeding 5, 6, and 7-year old birds as y-shearwaters (i.e. as truly sexually immature) or as adolescent z-shearwaters, potentially capable of reproducing, but unsuccessful as yet in finding mates or nesting territories. Certainly one individual of each of these age-groups has bred on Fisher Island but the majority of the sample under review have not done so.

The immature age-groups may be tentatively assigned to Fisher's formula as follows: $x = 2$, 3, or 4; $y = 2$, 3, or 4.

A histological study of these age groups will be made later when more is learnt of their ecological background.

III. References

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