on the beach at Dargaville on 29 February 1976. Murphy (1936; *Oceanic Birds of the South America.* New York: Macmillan) describes similar cases. The *Annotated Checklist of the Birds of New Zealand* (OSNZ 1970) lists Blackfooted Albatrosses *(Diomedea nigripes),* Leach's Storm Petrel *(Oceanodroma leucorhoa)* and Hawaiian Wedge-tailed Shearwater *(Puffinus pacificus cuneatus)* as other examples of tropical or North Pacific species which have occurred as stragglers to New Zealand.

The Christmas Island Shearwater, which has a sooty brown plumage, shiny black beak and dark brown legs, was recognised from other dark shearwaters by the following characters:

1. The Sooty Shearwater *(Puffinus griseus)* and Fleshy-footed Shearwater *(Puffinus carneipes)* by its smaller size.
2. The dark phase Wedge-tailed Shearwater *(Puffinus pacificus)* by its short round tail.
3. The Short-tailed Shearwater *(Puffinus tenuirostris)* by its slender body, shorter, less pointed wings, and a stouter shiny black beak.

Measurements of the Dargaville specimen (in mm) are as follows: Bill 31.4, Wing 243, Tarsus 45.5, Toe 46.8, Tail 84.5. These relate closely to measurements recorded by Ashmole & Ashmole (1967, *Bull. Peabody Mus. Nat. Hist,* 24).

The specimen was forwarded to the National Museum of New Zealand and is now included in its collection.

I would like to thank the members of the Beach Patrol on 29 February 1976 for their effort and co-operation, the staff at the N.Z. Meteorological Service, Wellington, for details of weather in the Tasman Sea during January and February 1976, Mr F. C. Kinsky for his assistance and confirmation of identification and Mr A. T. Edgar for reading this paper and making helpful comments.

DAVID E. CROCKETT, *21 McMillan Avenue, Kamo, Northland*

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THE RELATIONSHIP OF SPRING MORTALITY PATTERNS IN THE SHORT-TAILED AND SOOTY SHEARWATERS

Imber & Crockett (1970, *Notornis* 17 (3): 223-230) described a much greater than usual mortality of the Short-tailed Shearwater *(Puffinus tenuirostris)* in New Zealand in the spring of 1968. This was accompanied by a large mortality of prions (*Pachyptila* spp.). The mortality of Sooty Shearwaters *(Puffinus griseus)* was considered to be less than usual.

These observations were mainly attributed to the weather, for there was an unusually protracted period of strong westerly winds from mid-September to late November. A food shortage was considered but dismissed on the assumption that *P. tenuirostris* and *P. griseus* take very similar foods. Their explanation was that as *P. tenuirostris* is an Australian breeding species and *P. griseus* mainly a New Zealand species,

P. tenuirostris were blown onto the New Zealand coast but *P. griseus* were blown away from it to the east. This hypothesis is attractive but probably only partly explains the situation. I maintain that the importance of a probable food difference between these species has not been appreciated.

The observations in Table 1 contribute to the solution of this problem. The data for 1968 and 1969 are my own. The remainder were collected by members of the New South Wales Field Ornithologists Club, to which I was an important contributor in 1970, 1974 and 1975. The data for 1970 to 1975 have been published; references are available in Holmes (1977, *Australas. Seabd. Gp. Newsl.* 8: 20-35).

TABLE 1 — MORTALITY OF *Puffinus griseus* RELATIVE TO *P. tenuirostris* IN NEW SOUTH WALES, 1968-1975

	1968	1969	1970	1971	1972	1973	1974	1975
P. tenuirostris	4373	2574	1068	593	3769	1473	6928	2353
P. griseus	14	27	20	4	21	15	27	49
P. griseus (%)	0.32	1.05	1.87	0.67	0.56	1.02	0.39	2.08

If *P. tenuirostris* and *P. griseus* take the same food their mortality patterns should be closely correlated. In the table the mortality of *P. griseus* is expressed as a percentage of the total mortality of both species. This gives the mortality of *P. griseus* relative to *P. tenuirostris*. The four years of greatest mortality in *P. griseus* were 1975, 1970, 1969 and 1973. The two years of greatest mortality in *P. tenuirostris* were without doubt 1968 and 1974. The relationship of mortality in these two species is therefore frequently inverse. This is difficult to explain unless they have a difference in food. It is significant that the 1968 mortality of *P. tenuirostris* in New Zealand corresponded to a similar mortality in NSW, where westerly winds would be expected to drift dead birds away from the coast. Clearly some widespread factor was operating. This is most likely to be food shortage. The greatest mortality of *P. griseus* in New Zealand for the period 1961-75 occurred in 1975 (Veitch 1977, *Notornis* 24 (1): 41-49). This mortality was also observed in N.S.W. (see Table 1), so a widespread food shortage is again indicated. Apparently *P. tenuirostris* was not particularly affected at this time.

On the basis of these observations I suggest that *P. tenuirostris* occupies a lower trophic level than *P. griseus*, being much more dependent on plankton. Its smaller size and great abundance both support this probability. Furthermore the large prion mortality in New Zealand in 1968 at the time of the *P. tenuirostris* mortality indicates a shortage of plankton, for they are the most specialised plankton feeders.

GLENN HOLMES, *Department of Zoology, University of New England, 2 St Cuthberts Avenue, Armidale, N.S.W., Australia 2351*