

In view of the tendency among waterfowl to lay on occasion in nests other than their own (Friedmann *op.cit.*), it may be that the behaviour cited above for *O. australis* and *B. lobata* is a response to local crowded conditions. On the other hand, the relatively huge eggs of the Oxyurini, with their unusual physiology, and the apparent obligate parasitism of *H. atricapilla*, give grounds for interpreting the above behaviour of the two Australian species as facultative parasitism. The incidence of parasitism in the Australian stiff-tails, the hatching success of host-brooded eggs and the degree of foster-parental care given to the young are matters deserving further attention.

We should like to thank Dr L. W. Braithwaite, Division of Wildlife Research, CSIRO, Canberra and Mr S.

The Late A. R. ATTILL,

J. M. BOURNE, *Private Bag 240, Naracoorte, SA 5271.*

S. A. PARKER, *South Australian Museum, North Terrace, Adelaide, SA 5000.*

28 September 1979.

MIGRATION BY HUTTON'S SHEARWATER

Hutton's Shearwater *Puffinus huttoni* is a medium-sized black-and-white shearwater, which Serventy *et al.* (1971) and Harper and Kinsky (1978) regard as a substantially sedentary species, restricted to waters between Cook Strait and Banks Peninsula on the South Island of New Zealand, although they record that immature birds regularly visit southern Australia. The species breeds in the Seaward Kaikoura Mountains at heights over 1,300 metres above sea-level (Harrow 1965). Birds return to the breeding grounds in September and leave in March or early April when many newly fledged birds have been collected (Harrow 1965, 1976; Falla 1965). Recent observations show that at least some *P. huttoni* spend the season, when not breeding, in the northern Indian Ocean.

I spent 31 July to 6 August 1978 and 30 July to 9 August 1979 about twenty-five kilometres north of Point Cloates, WA. Every day, in four to six hours of observation, several hundred *P. huttoni* were seen about five kilometres offshore (22°30'S, 113°40'E), usually in small flocks comprising between four and twenty birds, but occasionally single birds were seen. All *P. huttoni* that I saw were travelling south. Large numbers of Wedge-tailed Shearwaters *P. pacificus* were also travelling southwards; they frequently gathered in large flocks of more than a hundred birds to feed in association with schools of bonito-like fish. In contrast, only rarely did a few *P. huttoni* join these feeding flocks and no large feeding flocks of the species formed. All *P. huttoni* were at least five kilometres from the shore, i.e. three kilometres or more outside the line of coastal reefs along

Marchant for their comments on a draft of this note.

REFERENCES

- CAMPBELL, A. J. 1900. Nests and Eggs of Australian Birds, 2. Sheffield: privately.
- DELACOUR, J. 1959. The Waterfowl of the World, 3. London: Country Life.
- FRIEDMANN, H. 1932. The parasitic habit in the ducks: a theoretical consideration. Proc. US natn. Mus. 80 (18): 1-7.
- FRITH, H. J. 1977. Waterfowl in Australia. 2nd ed. Sydney: Reed.
- HÖHN, E. O. 1975. Notes on Black-headed Ducks, Painted Snipe and Spotted Tinamous. Auk 92: 566-575.
- LASHMAR, A. F. C. 1937. Nesting activities in the eastern portion of Kangaroo Island. Season 1936-7. S. Aust. Orn. 14: 59-64.

this part of the Western Australian coastline. It is not known how much farther offshore the birds occurred.

A specimen of *P. huttoni* was collected on 9 August 1979 and lodged with the Western Australian Museum (Reg. No. A16233). Its details are: total length 337 mm; wing 224 mm; tail 73 mm; entire culmen 49.8 mm; exposed culmen 37.5 mm; inside leg and webs of foot pale pink, outside leg and toes dark brown; weight (frozen) 370 g. Details of plumage are as described by Kinsky and Fowler (1973) for *P. huttoni*: under wing-coverts with dark shafts and smudgy brown outer vanes from carpal joint outwards; long axillaries dark brown and oval-ended; exposed under tail-coverts white but anterior lateral feathers having brown outer vanes; longest (concealed) pair of under tail-coverts mainly dark brown. The bird was a female with abundant subcutaneous and sub-peritoneal fat and an ovary measuring 15.0 × 5.5 millimetres. Histological examination of this ovary showed it contained pedunculate secondary follicles, several of which were 1.3 millimetres in diameter. In the bird's crop were the remains of fish up to thirty millimetres long.

A second specimen, which had been dead for one or two days, was collected on North Cottesloe Beach (31°58'S, 115°45'E) by Miss Ednah Milne on 21 October 1979 and lodged with the Western Australian Museum (Reg. No. A16281). Its details are: total length 361 mm; wing 217 mm; tail 67.5 mm; entire culmen (tip lost) 48 mm; exposed culmen 36 mm; weight 252 g. Coloration of soft parts and plumage is similar to that of the first specimen. The bird appeared to be mature but non-

breeding; it was a male with no sub-cutaneous nor sub-peritoneal fat and testes measuring 5×3 and 5×2.5 millimetres.

According to Serventy *et al.* (1971) *P. huttoni* is seen commonly in large flocks between Cook Strait and Banks Peninsula from May to August inclusive and Harrow (1976) reported that he has seen *P. huttoni* in all months of the year. However, until 1970 no recently dead specimens of *P. huttoni* had been collected in New Zealand in July or August and few specimens had been collected in May and June (Imber and Crockett 1970; Falla 1965; also see Harrow 1976). This paucity of specimens collected during winter led Imber and Crockett (1970) to suggest that 'it seems certain . . . that the entire population of *huttoni* leaves New Zealand seas during autumn and they return in spring'. Because large numbers of *P. huttoni* were seen off Point Cloates, I suggest that the species spends winter in the northern Indian Ocean, although possibly some breeding birds remain in New Zealand waters. The Manx Shearwater *P. puffinus*, which is closely related to *P. huttoni* (see Murphy 1952; Kinsky in Robinson 1973), undertakes a similar migration outside the breeding season from western Europe into the south-western Atlantic Ocean (Harris 1966; Thomson 1965).

Most specimens of *P. huttoni* previously collected from Australian waters have been immature birds taken between September and March inclusive (Robinson 1973, pers. comm.) (see Fig. 1), which is during this species's breeding season. Some non-breeding birds probably spend part of, or all, the breeding season in waters off New Zealand and southern Australia instead of returning to the breeding colonies in the Seaward Kaikoura Mountains. The Manx Shearwater behaves similarly; most immature and many non-breeding mature birds do not return to the breeding grounds but spend the breeding season in the Bay of Biscay (Orians 1958; Harris 1966).

Only four specimens of *P. huttoni* have been collected in Australian waters outside the breeding season (Fig. 1); three of these were beach-wrecked, the other was shot off Point Cloates. Of the beach-wrecked specimens, one was collected at Bunbury on 23 April 1937, another at Swanbourne Beach, near Perth, on 13 June 1956 (Serventy and Whittell 1976) and the third was collected at Wilunga, South Australia, on 28 July 1970 (Robinson 1973). Though few inferences can be drawn from isolated discoveries of beach-wrecked birds, it is noteworthy that two of these were found on the Western Australian coast. The bird collected at Bunbury in late April may have been taking part in the species's northwards migration.

Two other points deserve mention. In discussing breeding of petrels in New Zealand, Falla (1934) noted that petrels that undertake a regular migration tend to have a later, better synchronized breeding season than sedentary petrels. On the basis of this observation, one would predict that the period of egg-laying would be

later and shorter in the migratory *P. huttoni* than in the closely related sedentary species, *P. gavia*. In fact *P. huttoni* does begin laying about a month later than *P. gavia* (Serventy *et al.* 1971; Harrow 1976). Probably later breeding in *P. huttoni* is associated with nesting at high altitudes rather than migration, although the species breeds no earlier in warm years when there is no snow round the nesting burrows. In years when spring is late breeding is delayed in parts of the colony where snow persists (Harrow 1976). Egg-laying is spread over about three weeks in both *P. huttoni* and *P. gavia* (Serventy *et al.* 1971; Harrow 1976), a considerably shorter time than in the related migratory *P. puffinus*, which lays eggs over at least a six-week period (Harris 1966).

It is puzzling that these large migratory flocks of *P. huttoni* have not been observed offshore farther south in Western Australia where more people live. The explanation may be that the migratory route of *P. huttoni* along the Western Australian coastline follows the edge of the continental shelf, which is less than eight kilometres wide near Point Cloates. Farther south the continental shelf is much wider (25 to 65 km; maps of Hydrographic Service, Royal Australian Navy).

I would like to thank Mr R. E. Johnstone and Dr G. M. Storr, Western Australian Museum, for identifying the specimen of *P. huttoni* and reading the manuscript, Mr R. D. Robinson for providing information about specimens of *P. huttoni* collected in Australia and Mr J. A. Bartle, National Museum, Wellington, for information about the species in New Zealand.

REFERENCES

- FALLA, R. A. 1934. The distribution and breeding habits of petrels in northern New Zealand. *Rec. Auckland Inst. Mus.* 1: 245-260.
 — 1965. Distribution of Hutton's Shearwater in New Zealand. *Notornis* 12: 66-69.

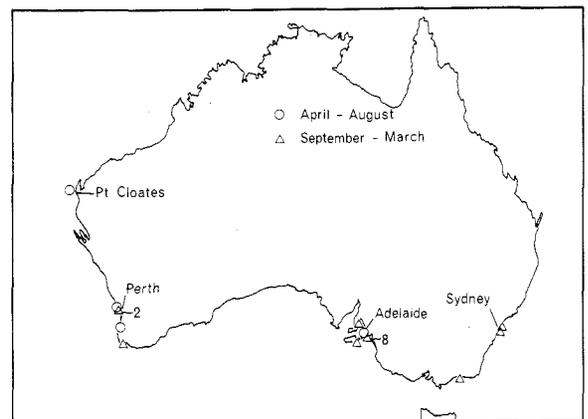


Figure 1. Collecting localities of twenty specimens of *P. huttoni* from Australian waters outside (April-August) and during the breeding season (from Robinson 1973, pers. comm.; Serventy and Whittell 1976).

- HARPER, P. C., and F. C. KINSKY. 1978. Southern albatrosses and petrels: an identification guide. Wellington: Victoria Univ. Press.
- HARRIS, M. P. 1966. Breeding biology of the Manx Shearwater *Puffinus puffinus*. Ibis 108: 17-33.
- HARROW, G. 1965. Preliminary report on discovery of nesting site of Hutton's Shearwater. Notornis 12: 59-65.
- 1976. Some observations of Hutton's Shearwater. Notornis 23: 269-288.
- IMBER, M. J., and D. E. CROCKETT. 1970. Sea birds found dead in New Zealand in 1968. Notornis 17: 223-230.
- KINSKY, F. C., and J. A. FOWLER. 1973. A Manx Shearwater (*Puffinus p. puffinus*) in New Zealand. Notornis 20: 14-20.
- MURPHY, R. C. 1952. The Manx Shearwater, *Puffinus puffinus*, as a species of world-wide distribution. Am. Mus. Novit. (1586): 1-21.
- ORIAN, G. H. 1958. A capture-recapture analysis of a shearwater population. J. Anim. Ecol. 27: 71-86.
- ROBINSON, R. D. 1973. The white-breasted petrels of southern Australian waters. Emu 73: 101-106.
- SERVENTY, D. L., V. N. SERVENTY and J. WARHAM. 1971. Handbook of Australian Sea-birds. Melbourne: Reed.
- , and H. M. WHITTELL. 1976. Birds of Western Australia. 5th ed. Perth: Univ. West. Aust.
- THOMSON, A. L. 1965. The transequatorial migration of the Manx Shearwater (*Puffin des Anglais*). Oiseau Revue fr. Orn. 35: 130-140.

S. A. HALSE, *Department of Surgery, University of Western Australia, Nedlands, WA 6009.*

Present address: *Department of Zoology, University of Witwatersrand, Jan Smuts Avenue, Johannesburg 2001, Republic of South Africa.*

16 October 1979.

DOES HUTTON'S SHEARWATER CIRCUMNAVIGATE AUSTRALIA?

Halse (1981, Emu 81: 42-44) reports seeing several hundred Hutton's Shearwaters *Puffinus huttoni* about five kilometres offshore and some twenty-five kilometres north of Point Cloates, WA, at 22°30'S, 113°40'E. In conjunction with other recent sightings round Australia this report suggests that part of the population of this Shearwater may circumnavigate Australia in a counter-clockwise direction.

Halse's birds were seen between 31 July and 6 August 1978 and 30 July to 9 August 1979. All were travelling south. The identification was clinched by the collection of a specimen now in the Western Australian Museum. However, between June and September 1965-70 Shuntov (1974, Seabirds and the biological structure of the ocean. Translation; US Dept. of Commerce) recorded 'small sized white-bellied shearwaters' as common over the continental shelf off north-western Australia. He provisionally identified them as *P. gavia*. It now seems possible that they were the very closely related *P. huttoni*. The only banded bird recorded from Australia seems to be the one marked near Christchurch, NZ, on 31 March 1969 and found dead at Hopetoun, WA, on 11 December 1970 (1973, Aust. Bird Bander 11: 85).

On the other side of the continent sightings off Queensland as far north as 17°S by Corben *et al.* (1974, Sunbird 5: 55-56) in May, June and August suggest that

Hutton's Shearwaters are more common off eastern Australia than has hitherto been supposed. Now comes D. P. Vernon's record (1977, Sunbird 8: 92) of a specimen from Booby Island, Q, and another from the same place found weak but alive on 5 May 1976 which show that the species may penetrate Torres Strait. Both specimens, collected by A. Hersom, are in the Queensland Museum.

The bird is known to breed only in the mountains inland from Kaikoura where it was discovered in 1965 by G. Harrow. He reported (1976, Notornis 23: 269-288) its occurrence in New Zealand waters throughout the year and suggested that birds in Australian seas belonged to the pre-breeding part of the population. The purpose of the present note is to draw attention to the possibility that such birds may circumnavigate Australia during their pre-breeding years and for the need for further sightings, specimens and even *nil* reports from the coasts and seas off northern Australia.

The timing of such a movement could possibly be unravelled from the dates of sightings at different places along the migration path but, should the birds remain overseas before returning to the colonies (probably not before they are two years old), then the pattern may be hard to resolve.

JOHN WARHAM, *Department of Zoology, University of Canterbury, Christchurch, NZ.*
11 September 1980.

UNEQUAL SEX RATIOS AMONG SEABIRDS FOUND BEACH-WASHED

Examples of unequal sex ratios among seabirds found beach-washed have been explained by segregation of the sexes at sea (e.g. Dell 1952; Hindwood and McGill 1955; Serventy 1967). A possible example of such segregation

was described for Wilson's Storm-Petrel *Oceanites oceanicus* by Huber (1971). He collected birds at sea on their post-breeding migration in the central western Pacific Ocean; females appeared to be more abundant in