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Historical and Archaeological Aspects of Muttonbirding in New Zealand

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ABSTRACT

Muttonbirding involved the catching and preparation for storage of fledgling Procellariiformes, notably the sooty shearwater (*Puffinus griseus*) in Foveaux Strait. The historical industry, described briefly here, provided an important source of food for winter consumption and also a valued item of exchange. Archaeological data show that while muttonbirds (here confined to shearwaters), were widely exploited in prehistoric New Zealand, there is still only one probably early site at which systematic harvesting of the historical form can be documented. In addition, there is almost no evidence, from any source, of prehistoric occupation of the muttonbird islands in Foveaux Strait. Consequently, whether muttonbirding has a long pre-European history or is a relatively modern phenomenon remains uncertain. However, I favour the latter view and argue that the development of muttonbirding may be related to resource depletion on the mainland.

Keywords: MUTTONBIRDING, SOOTY SHEARWATER, FOVEAUX STRAIT, ARCHAEOLOGY, ETHNOGRAPHY.

INTRODUCTION

Muttonbirding is the body of techniques whereby the chicks and fledglings of various Procellariiformes were processed as preserved food. Although the range of taxa potentially available to muttonbirding in New Zealand is wide (Table 1), and many species were exploited in that way, the major industry was concentrated upon the Foveaux Strait population of sooty shearwater (*Puffinus griseus*), commonly called 'the muttonbird'. In this paper, I describe the historical and archaeological background to muttonbirding in New Zealand and discuss how it might have developed, particularly in Foveaux Strait. Muttonbirds, or *tītī*, are currently harvested there from 21 islands (Fig. 1) which, together with Ruapuke Island, were reserved for Kai Tahu owners at the time of the sale of Stewart Island (Rakiura) to the Crown in 1864. Descendants of those owners have a beneficial right to take muttonbirds in season on those islands and, by permit, on Crown islands (Howard 1940; Richdale 1942–43, 1944, 1948; Sansom 1967).

HISTORICAL AND ETHNOGRAPHIC BACKGROUND

The earliest historical record of muttonbirding in New Zealand is in the log of the cutter *Mermaid*, by Captain John Kent who visited Ruapuke Island in June 1823. Kent (in Howard

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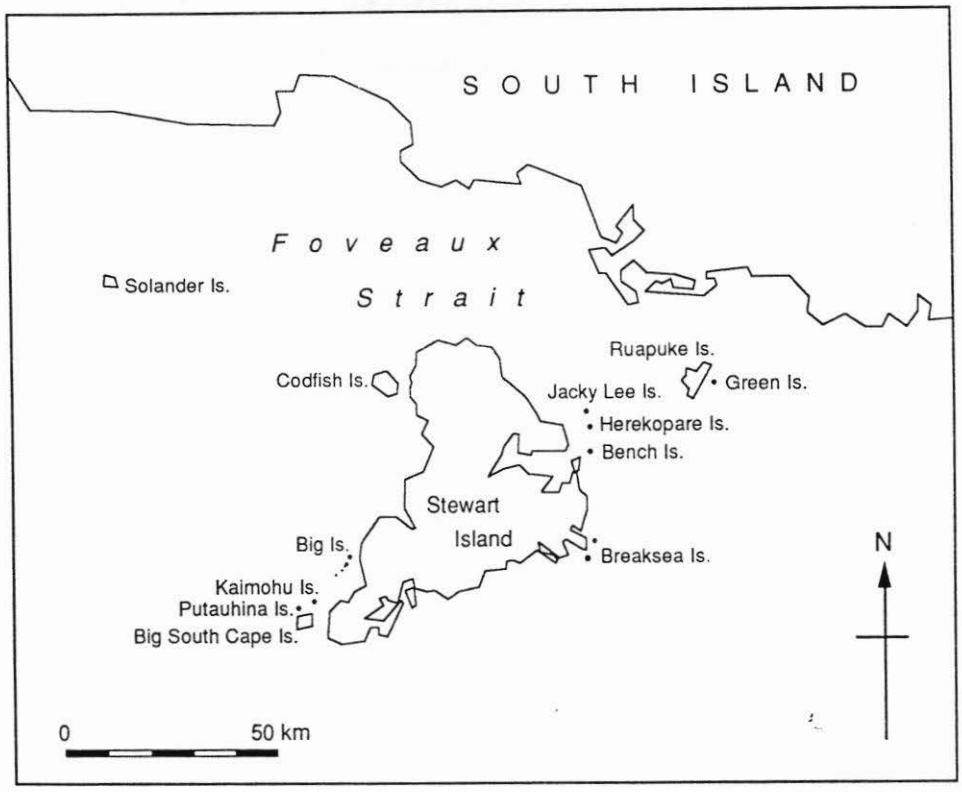

Figure 1: Foveaux Strait and Stewart Island, showing location of muttonbird (*tītī*) islands, some named.

1940: 345), noticed "stacks of preserved mutton birds" lying against the Māori huts and later heard about two canoes of muttonbirders foundering in heavy seas. He also noted that some of the muttonbirders on Ruapuke Island had come from as far afield as Kaikoura. In late March 1827 at Bluff, John Boultbee saw 11 canoes and 200 Māori who had come from the east coast, South Island, for the muttonbird season and, on another occasion, observed muttonbirding at first hand on one of the small islands immediately north of Stewart Island:

> ...up on the rising ground...were some thousands of birds, of which we took no small quantity. The 2 women and the man [local Māori travelling with Boultbee], skinned the birds and took out the principal bones, after which they roasted them and put them into large bags, made by splitting the immense sheets of kelp which abounds here—these bags being fastened up and kept airtight, prevent the birds from being tainted, and I have eaten of them after they had been 8 months in these bags, and found the meat as fresh as when put in. (in Starke 1986: 66)

Another aspect of native muttonbirding was observed by Edward Shortland in 1844. Travelling along the shore near Timaru, on the east coast, South Island, he came upon some boats hauled up on the beach and saw that the cargo consisted:

> ...chiefly of "poha-titi" or casks of preserved muttonbirds. Many of these were from five to six feet high, and ornamented with feathers: they were all designed as presents to relatives at Waiateruati [a village in south Canterbury], or Bank's Peninsula; and from the latter place, in all probability, a great number of them would be sent to the north side of Cook's Straits. The "poha," which I have called a cask—as it performs the office of one—is constructed...[from]...a kelp bag... In this the young "titi" are packed, after being cooked, and the oil which has escaped in the cooking is poured on them. Over the exterior of the bag is then laid the bark of the "totara" tree [*Podocarpus totara*], and the whole is strengthened by means of several sticks...with which the bag and its bark covering are pressed into the form of a sugar loaf. (Shortland 1851: 224–225)

TABLE 1
SMALL PROCELLARIIFORMES AVAILABLE FOR EXPLOITATION AS MUTTONBIRDS IN THE NEW ZEALAND REGION
(Falla, Sibson and Turbott 1979)

Giant petrel	*Macronectes giganteus*
Grey-faced petrel	*Pterodroma macroptera*
Mottled petrel	*Pterodroma inexpectata*
Pycroft's petrel	*Pterodroma pycrofti*
Cook's petrel	*Pterodroma cooki*
Broad-billed prion	*Pachyptila turtur*
Black petrel	*Procellaria parkinsoni*
Westland black petrel	*Procellaria westlandica*
Flesh-footed shearwater	*Puffinus carneipes*
Buller's shearwater	*Puffinus bulleri*
Sooty shearwater	*Puffinus griseus*
Fluttering shearwater	*Puffinus gavia*
Hutton's shearwater	*Puffinus huttoni*
Little shearwater	*Puffinus assimilis*
White-faced storm petrel	*Pelagodroma marina*
Diving petrel	*Pelecanoides urinatrix*
Only on Kermadecs:	
Sunday Island petrel	*Pterodroma cervicalis*
Kermadec petrel	*Pterodroma neglecta*
Black-winged petrel	*Pterodroma nigripennis*
Wedge-tailed shearwater	*Puffinus pacificus*
White-bellied storm petrel	*Fregetta grallaria*
Only on Chathams:	
Taiko	*Pterodroma magentae*
Chatham Island petrel	*Pterodroma axillaris*
Fulmar prion	*Pachyptila crassirostris*
Grey-backed storm petrel	*Garrodia nereis*
Only on Snares:	
Cape pigeon	*Daption capensis*

These early observations describe the essentials of Māori muttonbirding before significant European influence. There have been various changes since then, for instance in transport

and in preservation techniques, but much of the activity retains a traditional flavour. The following description draws on modern observations and recollections.

Until the use of metal containers (usually re-used kerosene tins) became a standard practice, the muttonbirding season began in late summer with the cutting of totara bark and large kelp (*D'Urvillea antarctica*) blades which were fashioned into bags (*pōhā*). In late March, the muttonbirders travelled to their beneficial islands and cleared the tracks through the scrub which they used to gain access to the muttonbird burrows and also, on the larger islands, to divide the hunting territories, held on a kinship basis and known as *manu* or *wakawaka*. The hunting season, which once began in March, is today confined by statute to the period April 1st to May 31st.

Traditionally, muttonbirding was divided into two sub-seasons. During April was the *nanao* or daylight hunting during which the chicks were pulled out of their nesting burrows and killed by a bite to the back of the head (Beattie 1920: 61). The dead chicks were then tied in bundles of five (two bundles were called a *hui*) and taken back to the camp. Up to ten *hui* could be carried by a single muttonbirder (Dacker pers. comm.). During May, with shorter daylight hours and more mature birds to contend with, there occurred the *rama* or 'torching' period. By that time the chicks would be coming out of their burrows at night to stretch their wings, and they could be caught and clubbed on the tracks. These birds were usually heavier and were a preferred catch (Richdale 1954: 594). The *rama* technique was especially fruitful on dark, cloudy nights when a burning torch made from totara bark soaked in muttonbird oil was used (Richdale 1948: 99). During the torching subseason it was customary to ignore the boundaries (*pahure*) of the family territories and to treat the larger islands as common ground, according to Wilson (1979: 68, although Dacker's [pers. comm.] informant, Harold Ashwell, said that *pahure* was an intermediate stage between *nanao* and *rama* during which the burrows were inspected for birds missed in the *nanao* subseason).

Back at the camp the stomach oil was squeezed out of the carcasses which were then plucked, dipped in hot water or wax to remove the down, and stripped of heads, wings and lower legs. Carcasses to be preserved in their own fat, which were known as *tītī-tahu*, then had the viscera and much of the backbone removed. They were cooked in hot muttonbird fat for up to an hour (in pre-European times this involved placing hot stones in wooden bowls (*ipu*) containing fat and carcasses, see Skinner 1943: 90) and, when drained and cool, were packed into kelp *pōhā* which were then filled with liquid fat and sealed. Some birds were also packed into *pōhā* in this way without being cooked. They were known as *tītī-puku* and they would remain edible for about six months, in comparison to two or three years in the case of *tītī-tahu*. In post-European times many birds were simply split and packed in salt (Richdale 1948: 98–104).

From the earliest historical records of southern New Zealand it is apparent that the annual *tītī* harvest was a major event involving Kai Tahu from as far north as Kaikoura. How many birds were taken is a matter which then, and now, can only be roughly estimated because there are no official records; but observers in the 1940s thought that 250,000 birds were taken per year from throughout New Zealand, mainly from Murihiku (Richdale 1963: 2). According to informal records collected by Wilson (1979: 65), some 200,000 birds were taken by Murihiku muttonbirders in 1909. About 50 people from Colac Bay and Riverton, on the mainland shore of Foveaux Strait, took 75,000 birds between them in 1897 (4200 of these were taken by two girls). The same group took 24,000 birds in 1921 and 14,000 in 1922. Clearly the annual harvest is highly variable and possibly cyclic, as many muttonbirders believe. Some very poor years have been noted (1912, 1942), but it is not

clear whether muttonbird stocks are actually in long-term decline; Wilson (1979: 65) records a catch of 30,000 on one island alone (Poutama), in 1969. On the other hand, many older muttonbirders recall seasons when the evening sky was black with returning birds to a degree not seen in modern times (Dacker pers. comm.).

The traditional Murihiku *tītī* islands were by far the major source, but there were many minor sources of muttonbirds as well, both close-by, such as on Codfish Island (Blackburn 1968), and further afield. In the South Island, small colonies of sooty shearwaters were exploited at Taieri Island, Otago Heads and Moeraki until within this century (Tim Te Maiharoa, Magda Wallscott, pers. comm.); there was muttonbirding on D'Urville Island (Grace 1901) and Stephen's Island (Hipparaiti 1895), while Hutton's shearwaters (*Puffinus huttoni*), were taken from subalpine colonies in the Kaikoura Ranges up to about A.D. 1900 (Harrow 1976). Doubtless there were many other exploited colonies of muttonbirds and, in addition, an occasional bird could be taken almost anywhere, as Shortland (1851: 239) found while camped near the Ashburton River. Skinner (1912), however, was told by Māori that there was no muttonbirding in Westland.

In the North Island, Māori muttonbirding between Northland and Bay of Plenty concentrated on the grey-faced petrel (*Pterodroma macroptera*), and it is recorded as a minor activity on the Rat Islands (Wagener 1966), Moturoa (Adams 1971), the Poor Knights (Harper 1983), Cavalli Islands (Sibson 1953), Stephenson Island, Whangaroa (Bell 1959), the Mercury Islands (Edgar 1962, Skegg 1962 [up to 500 taken per season and remains seen in Māori middens]); Arid Island (Hutton and Kirk 1868, Bell and Braithwaite 1964) and Whale Island (Imber 1976 [muttonbirding until 1962]). Buller's shearwater (*Puffinus bulleri*) was taken in the Poor Knights (Harper 1983), where it was preferred to the grey-faced petrel. The Ngatiwai people traded this species up to about the turn of the century. The fluttering shearwater (*Puffinus gavia*) was taken on Hauturu Island [Little Barrier] (Reischek 1885c), and the black petrel (*Procellaria parkinsoni*), was taken on Little Barrier Island (Reischek 1885a) and Karewa Island (Buller 1877). Cook's petrel (*Pterodroma cooki*) and the little shearwater (*Puffinus assimilis*) were taken in the Hen and Chickens Islands (Reischek 1885b, 1885d). Muttonbirding of unspecified taxa also occurred in the Urewera country (Best 1909, 1977: 346), where birds returning to their colonies were taken in nets; a technique also employed at Puketiti in Hawkes Bay. On the North Island west coast, there was muttonbirding in the hills near Mount Egmont (Dieffenbach 1843: 148), near Whanganui (Field 1876), and on Kapiti Island (Carkeek 1966: 161).

In the Chatham Islands, muttonbirding for various species, including the magenta petrel or taiko (*Pterodroma magentae*) was recorded by Travers and Travers (1872), Shand (1894) and Imber and Lovegrove (1982). In the Kermadec Islands, European settlers made extensive use of the local muttonbird species, as recorded by Morton (1957: 85–86).

Preserved muttonbirds formed an important element of Māori exchange networks, particularly in the South Island. Shortland's (1851: 224–33) observations of muttonbird feasting and gift-exchange at Waikouaiti and Waiateruati villages and of the onward progress of gifted *pōhā tītī* to Banks Peninsula in the summer of 1844, are matched by those other early observers, as described in Anderson (1980: 14–16). Similar systems occurred in other areas where muttonbirds were obtained, for instance in the northern South Island where Hipparaiti (1895) described a regular exchange, which lasted until about 1890, of muttonbirds from Stephen's Island for potatoes from the Wairau Valley and other foods. It is difficult to assess the value of muttonbirds to these historical exchange systems, except to say that by the early nineteenth century preserved *tītī* seem to have been one of the most important of the indigenous foods exchanged within the Kai Tahu tribe.

Muttonbirds also represented a potential source of wealth in European terms. They were not sought as food by Europeans to any degree; Captain Stokes, in 1851, described them as "...most disgusting objects with a rank rammish odour..." (in Howard 1940: 386), but they could be sold between Māori, and had a cash value in the nascent Māori market economy of about two pounds sterling per hundred in the mid 1840s. That money could then be turned into European goods. Some idea of the potential value may be gauged by the relative purchase price of a secondhand whaleboat, a major capital item, which was about forty pounds in the 1840s (Anderson 1980). There is, though, little to suggest that Māori sold muttonbirds on a large scale until the late nineteenth century (Dacker pers. comm.).

With that background I turn to the archaeological evidence of pre-European muttonbirding in New Zealand.

PRE-EUROPEAN MĀORI MUTTONBIRDING

The first point that needs to be made is that exploitation of the sooty shearwater took place within a broader strategy of coastal fowling. To take only one example, at Waihora site in the Chathams (Sutton 1979a) the single most abundant coastal species (MNI = 292) was the little blue penguin (*Eudyptula minor chathamensis*), a colonial breeder which uses burrows like the Procellariiformes. Next most important (MNI = 162), was the diving petrel (*Pelecanoides urinatrix chathamensis*). Against these, and against other Procellariiformes in Chathams middens (notably *Pterodroma magentae*, Sutton 1979b) the numbers of shearwaters (MNI = 46 amongst three species) are very modest (see Table 2).

Secondly, even narrowing the definition of muttonbirds to include only those juveniles of the small species of Procellariiformes (petrels, prions and shearwaters) which were processed for preservation, still leaves a very wide choice. The New Zealand region stretches from the subtropical Kermadecs to the subantarctic archipelagoes and east to the Chathams. In Table 1 are listed all the species which breed, or bred, in areas where there is also evidence of pre-European human occupation (this extended as far south as the Snares Islands). I should emphasise, perhaps, that a breeding colony is essential for muttonbirding and that catching adults of the species concerned is not muttonbirding in the strict sense.

In addition, remains of small Procellariiformes which breed outside the New Zealand region can occur in archaeological sites here. Notable amongst these is the short-tailed or Tasmanian muttonbird (*Puffinus tenuirostris*) which breeds today only in Bass Strait and other areas of southern Australia. Nevertheless, it occurs in one of every six New Zealand archaeological sites containing shearwater remains. Whether it might once have bred in New Zealand is a question that cannot be answered from the current archaeological evidence. We need clearly immature remains from secure stratigraphic contexts to clinch that matter.

For the archaeological data I restrict attention to the shearwaters. These are the major muttonbird species on mainland New Zealand but petrels were more abundant on the outlying groups, notably the taiko in archaeological sites on the Chathams (Sutton 1979b), and the Kermadec petrel (*Pterodroma neglecta*) in the Low Flat site on Raoul Island (Anderson 1981a).

TABLE 2
MINIMUM NUMBERS OF INDIVIDUALS OF SHEARWATER SPECIES CALCULATED FROM REMAINS IN ARCHAEOLOGICAL SITES IN NEW ZEALAND

Species: A = sooty shearwater, B = fluttering shearwater, C = short-tailed shearwater, D = flesh-footed shearwater, E = little shearwater, F = Buller's shearwater, G = sooty or short-tailed shearwater (unable to identify which), H = fluttering or Hutton's shearwater (unable to identify which), I = shearwater (unable to identify species), x = species present but no MNI available.

North Island Sites	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Spirits Bay	x	x	-	-	-	-	-	-	-
Tom Bowling Bay	x	x	x	-	x	x	-	-	-
Houhora	-	-	-	-	-	-	-	-	x
Harataonga	-	x	-	-	-	x	-	-	-
Ocean Beach	-	x	-	-	-	-	-	-	-
Sunde (Oyster lens)	-	1	-	-	-	-	-	-	-
Opito (Skippers)	x	x	-	x	-	-	-	-	-
Opito (Parkers)	-	1	-	26	-	-	-	-	-
Sarah's Gully	x	x	-	-	-	x	-	-	-
Cross Creek	4	-	1	-	-	-	-	-	1
Smuggler's Cove	-	-	1	-	-	-	-	-	-
Hotwater Beach	1	2	-	-	1	-	-	-	-
Tairua	-	-	-	-	-	-	-	-	x
Wheritoa	-	-	-	x	-	-	-	-	-
Home Bay	1	-	-	-	-	-	-	-	-
Mahia	-	1	-	-	-	-	-	-	-
Black Head	x	-	-	-	-	-	-	-	-
Kaupokonui	1	7	2	-	1	1	-	-	-
Te Awamate	-	1	-	-	?1	-	-	-	-
Washpool Midden	-	1	-	-	-	-	-	1	1
Black Rocks Pond	-	-	-	-	-	-	1	1	-
Black Rocks Crescent	-	-	-	-	-	-	-	13	-
Black Rocks Black	-	-	-	-	-	-	-	2	-
Paremata	-	x	-	-	-	-	-	-	-
Te Ika a Maru	x	x	-	-	-	-	-	-	-
South Island Sites									
Rotokura	1	-	-	-	-	-	-	-	-
Tahunanui	x	-	-	-	-	-	-	-	-
Marfell Beach	x	x	x	-	-	-	-	-	-
Heaphy Mouth	-	-	-	-	x	-	-	-	-
Whalers Bay Cave	x	x	-	-	-	-	-	-	-
Avoca Point	-	-	-	-	-	-	-	2	-
Redcliffs	-	2	-	-	-	-	-	-	-
Gooseneck Bend	-	1	-	-	-	-	-	-	-
Ahuriri	-	-	-	-	-	-	-	-	x
Hawksburn	1	-	-	-	-	-	-	-	-
Nenthorn	-	3	-	-	-	-	-	-	-
Tai Rua	-	1	-	-	-	-	-	-	-

Waimataitai	-	-	-	-	-	-	-	-	x
Shag Mouth	1	8	-	-	-	-	-	-	-
Shag Point	-	-	-	-	-	-	-	-	x
Omimi	-	1	-	-	-	-	-	-	-
Ross's Rocks	-	1	-	-	-	-	-	-	-
Mapoutahi	-	1	-	-	-	-	-	-	-
Purakanui	-	3	-	-	-	-	-	-	-
Long Beach	5	10	1	-	2	-	-	-	-
Papanui Beach	-	1	-	-	-	-	-	-	-
Otokia	-	1	-	-	-	-	-	-	-
Pounawea	9	2	-	-	-	-	-	-	-
Kings Rock	x	-	-	-	-	-	-	-	-
Papatowai (TT1)	2	-	-	-	-	-	-	-	-
Papatowai (PPT)	3	-	1	-	-	-	-	-	3
Tautuku	x	x	x	-	-	-	-	-	-
Tiwai Point	177	1	2	-	-	-	-	-	-
Riverton	5	6	2	-	-	-	-	-	-
Wakapatu	1	2	-	-	-	-	-	-	-
Sandhill Point	1	-	-	-	-	-	-	-	-
Chalky 1	-	-	-	-	-	-	-	-	x
Southport 1	-	2	-	-	-	-	-	-	-
Southport 5	-	2	-	-	-	-	-	-	-
Southport 9	2	-	-	-	-	-	-	-	-
Southport 10	-	1	-	-	-	-	-	-	-
Long Island 1	-	1	-	-	-	-	-	-	-
Breaksea Sound 1	-	1	-	-	-	-	-	-	-
Stewart Island Sites									
Old Neck	x	x	-	-	-	-	-	-	-
Native Island	x	x	-	-	-	-	-	-	-
Ringaringa	x	-	x	-	-	-	-	-	-
Ruapuke, Lee Island	23	6	-	-	-	-	-	-	-
Ruapuke, Parangiaio	49	-	-	-	-	-	-	-	-
Ruapuke, West Point	16	18	-	-	-	-	-	-	-
Chatham Island Sites									
Waihora	18	22	6	-	-	-	-	-	-
CHA	-	2	-	-	-	-	-	-	-
CHB	1	4	1	-	-	-	-	-	-
CHC	-	1	1	-	-	-	-	-	-
Te Ngaio	1	-	-	-	-	-	-	-	-
Ohinemamao	1	-	-	-	-	-	-	-	-
Pokiako	2	-	-	-	-	-	-	-	-
Totals	**326**	**118**	**18**	**26**	**5**	**1**	**1**	**19**	**4**

Data from Ambrose (1970), Anderson (1979, 1981b, 1982, 1983a, 1983b), Anderson and Smith (1992), Butts (1977), Campbell (1975), Cassels *et al.* (1988),Coutts (1972, 1977), Coutts and Jurisich (1972), Davidson (1976, 1978, 1979), Davies (1980), Dawson (1949), Easdale and Jacomb (1986), Foley (1980), Hamel (1977, 1980), Higham (1968), Jeal (1987), Jolly and Murdoch (1973), Kirk (1989), Knight (1970), Leach (1979), Leach and Leach (1980), Leahy (1974), Lockerbie (1940, n.d.), McGovern-Wilson (1986), McGovern-Wilson *et al.* 1996, Millar (1971), Murdoch and Jolly (1967),

Nichol (1988), Rowland (1977, 1978), Scarlett (1979), Sewell (1984), Sinclair (1977), Spring-Rice (1963), Sutton (1979a, 1979b), Sutton and Marshall (1980), Thompson (1979), Trotter (1955, 1970a, 1970b, 1975, 1979, 1980), Wilkes and Scarlett (1967).

All the archaeological occurrences of shearwater remains that I have managed to find are shown in Table 2 (locations of sites in Fig. 2). The only exception is the Low Flat site (above) where remains of the wedge-tailed shearwater (*Puffinus pacificus*) were recovered (MNI = 2).

From these data we can note that there are 77 osteological assemblages from 76 archaeological sites of which 25 are in the North Island, 37 in the South Island, 6 in Stewart Island (including Ruapuke Island), 7 in the Chathams and 1 in the Kermadecs. The species which occurs most frequently in the archaeological sites as a whole is the fluttering shearwater (48 sites), followed by the sooty shearwater (36 sites), the short-tailed shearwater (14 sites), the little shearwater (6 sites), the flesh-footed shearwater (3 sites) Bullers's shearwater (1 site) and the wedge-tailed shearwater (1 site). However, in southern areas (the southernmost South Island, Stewart Island and the Chathams) the sooty shearwater occurs most commonly. There are no unequivocal identifications of Hutton's shearwater, but in seven sites the remains could not be discriminated between the fluttering and Hutton's shearwaters. The problem here, and quite commonly in other samples as well, is that the remains are fragmentary, either as the result of cultural behaviour (especially breakage and discard patterns) or because of post-depositional taphonomic processes. In addition, most material seems to have been identified only in hand specimen without benefit of magnification to check bone maturity, or measurement to verify taxa (Sutton pers. comm.). It would be worthwhile to go back to all identifications of Procellariiformes in New Zealand sites and check them carefully, for while it is unlikely that the broad pattern of taxonomic ascription would change, there might be important changes in detail.

In terms of abundance, the current data show that the most common species overall is the sooty shearwater (326 individuals recorded), followed by the fluttering shearwater (MNI = 118), the flesh-footed shearwater (MNI = 26), the short-tailed shearwater (MNI = 18), the little shearwater (MNI = 5), and Buller's and wedge-tailed shearwaters (MNI = 1 each). It should be noted, however, that 54.5 % of the sooty shearwater numbers are from a single site, Tiwai Point (Sutton and Marshall 1980).

There are relatively few data on the state of maturity represented by the bones. In the case of Tiwai Point, 138 individuals (77.9% of total MNI at the site) were immature or subadult, and this sample may be regarded as exemplifying the archaeological evidence which should be expected where systematic muttonbirding had taken place. Unfortunately, it is virtually the only case of its kind, and by far the largest sample. One of the difficulties at other sites, where remains are few, has been in recognising immature bone from fragmented samples, mostly shaft sections of leg and wing bones, which are the most commonly surviving elements (above).

Looking more broadly at the archaeology of muttonbirding, it is apparent that while the bulk of the muttonbird bones have been recovered from sites in southern New Zealand, there remains a curious scarcity of evidence of intensive exploitation. It was to this point that some recent fieldwork was addressed. During 1990 excavations were undertaken at Papatowai (Anderson and Smith 1992), the closest of the extensive Archaic midden sites to Tiwai Point and the muttonbird islands. One of our objectives was to obtain a large faunal sample to see whether we could detect evidence of systematic muttonbirding, either of processing as at Tiwai point, or of consumption of preserved birds. In the event, only very few muttonbird bones were recovered (Table 2). Tiwai Point remains, therefore, an

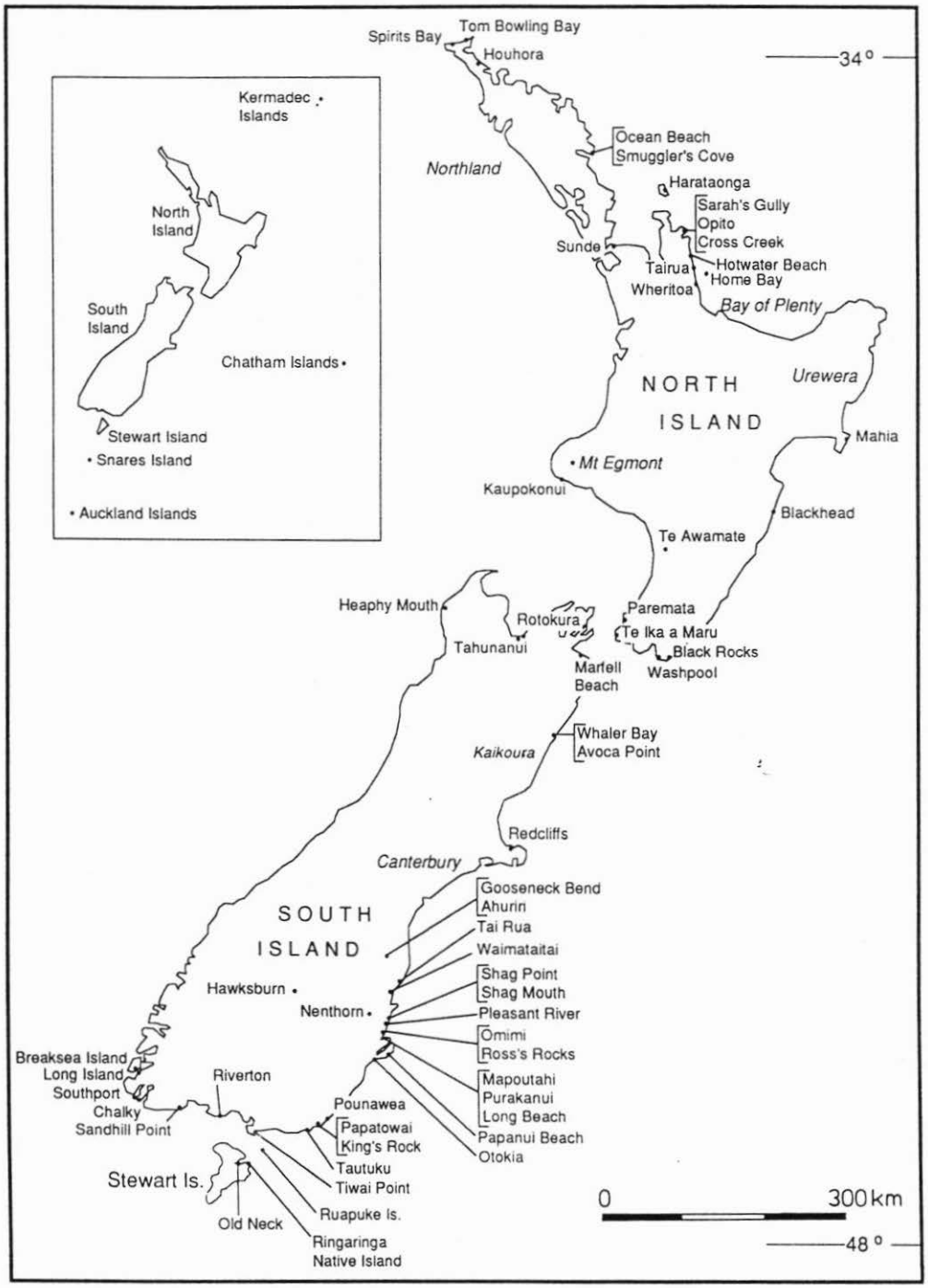

Figure 2: New Zealand, showing location of districts and archaeological sites mentioned in the text.

exceptional case and it must be concluded that exploitation of sooty shearwaters, as disclosed archaeologically, was opportunistic rather than systematic throughout pre-European New Zealand.

Another problem is the lack of archaeological data relating to the muttonbird islands, mainly, but not only, in Foveaux Strait. Middens containing muttonbird remains have been recorded in sites on Ruapuke Island (Coutts and Jurisich 1972), the traditional centre and collecting place of the industry, and occasionally elsewhere (above), but not on the islands where the great majority of the birds were caught. In addition, very few stone artefacts have been reported from the *tīrī* islands or are recorded in the Southland and Stewart Island museums. New Zealand Archaeological Association site record forms (unpublished), show only a flake of rock crystal (Southland Museum B77.509) which was found on Big Moggy Island (site C49/1, formerly S190/8). There are oral reports of a stone bowl found on one island, and an adze on another (Dacker pers. comm.).

In contrast, extensive archaeological remains, including middens, have been recorded on other islands in Foveaux Strait: Ruapuke Island (above), Rarotoka (Harsant 1986), and Dog Island (five midden and quarry sites recorded in New Zealand Archaeological Association files; E47/81–85 (formerly S181–182/92–96)), and within Paterson's Inlet on Stewart Island (New Zealand Archaeological Association site record forms for E48/42 (formerly S189/8), Groper Island; E48/38 (formerly S189/1), Native Island; E49/3 (formerly S189/11), Bravo Island). In addition, to the south of Stewart Island, a large Archaic adze (Canterbury Museum E 188.49) has been recovered from the main Snares island and there are middens and other Māori archaeological sites of the early nineteenth century at Sandy Bay on Enderby Island, in the Auckland Islands group (New Zealand Archaeological Association site record forms).

DISCUSSION AND CONCLUSIONS

To understand the development of the prehistoric muttonbirding industry in New Zealand it is necessary, therefore, to explain two outstanding disparities in the current evidence: firstly, the scarcity of archaeological remains reported from the *tīrī* islands in comparison with other islands in the same general area and, secondly, the general incongruity between historical observations of systematic, intensive muttonbirding and archaeological data indicative, with only one exception, of casual, opportunistic exploitation.

In regard to the first problem, it is very difficult to tell whether the distribution of current archaeological evidence is a real and consistent phenomenon because the *tīrī* islands have never been subject to systematic archaeological site recording and will not be in the foreseeable future. In addition, occasional discoveries of stone implements, for instance, might not be reported and they may have been kept on the islands, even re-buried (Dacker pers. comm.). Nevertheless, I have been allowed to inspect several *tīrī* islands immediately to the south of Ruapuke Island and I could see no evidence of pre-European occupation on the exposed ground or in coastal sections—no midden remains, traces of former earth ovens (*umu*), or pieces of burnt or flaked stone; all remains otherwise easily observable where there has been pre-European Māori settlement of any kind.

It is possible that domestic rubbish, including faunal remains, was routinely discarded into the sea on small *tīrī* islands. This is the standard practice today, according to Dacker's (pers. comm.) informants. It may be argued that this practice arises from traditional Māori sensitivity towards the proximity of food remains, but that proposition does not take account

of the formation of middens with muttonbird remains on Lee Island, a small islet near Ruapuke Island (Coutts and Jurisich 1972), nor the conflict of other allegedly traditional views about disposal at sea with prohibitions on this practice in regard to fishing, nor the archaeological evidence from many sites in New Zealand suggestive of considerable tolerance of food remains of all kinds in domestic areas. It would be unwise to project modern Māori views and associated rationale into the pre-European past.

Another possibility is that soil chemistry resulting from muttonbird colonisation destroyed bone and shell more rapidly than on other islands (though this was not the case on Maatsuyker Island, Tasmania, where Vanderwal and Horton (1984) found abundant muttonbird bone in a midden located within a modern muttonbird [*Puffinus tenuirostris*] colony). Constant burrowing by muttonbirds may also have obliterated traces of prehistoric structures, such as terraces, postholes etc. None of these factors, however, account for the scarcity of stone artefacts.

It is possible that the nature of muttonbirding and associated activities, such as the building of characteristic brushwood shelters (*whare porotaka*, Anderson 1986), required no other stone artefacts than a few sharp flakes and an adze to chop the shelter supports, but if there had been widespread annual occupation of the *tītī* islands for hundreds of years before the arrival of Europeans then we would expect a substantial accumulation of lost or discarded stone tools. In that event, it is likely that some indication of it would have emerged by now, in the writings of European scientists who worked on the *tītī* islands, such as Richdale; in the numerous articles about life on the *tītī* islands which were contributed by southern Māori to local newspapers during the early twentieth century, or in compendia of muttonbirders' reminiscences (e.g., Wilson 1979).

Perhaps one independent clue in this matter is that the Pacific rat (*Rattus exulans*), which accompanied Polynesian settlement of New Zealand, reached fewer of the *tītī* islands than the later, European-introduced, species (King 1990: 184), contrary to what might be supposed had there been regular Māori visitation over hundreds of years.

In the case of the second problem, there could be taphonomic reasons for the general scarcity of muttonbird remains in archaeological sites. The carcass preparation process discarded most of the bone at, or near, capture sites such as the *tītī* islands (or possibly Bluff hill in the case of the Tiwai Point processing site, Sutton and Marshall 1980), and there may be no other processing sites of any consequence amongst the archaeological sample. At consumption sites, on the other hand, we could expect only upper leg bones and part of the backbone. These were all that remained in carcasses which were cooked and preserved in fat (Richdale 1948: 101), the method which produced the best-preserved product. Since cooked bone also disintegrates more easily than fresh bone, it is possible that consumption of preserved muttonbirds contributes little or nothing in the way of resistant remains to archaeological sites. The relatively few bones which do survive may be from odd birds caught and processed locally.

Thus it is possible to construct an argument that an extensive prehistoric muttonbirding industry may have left relatively few traces which could be readily perceived by the archaeologist. However, there exists an alternative argument that muttonbirding is almost invisible archaeologically because it did not rise to prominence until late in the prehistoric era, or even soon after the arrival of Europeans. In so far as the archaeological evidence is concerned, most sites appear to be quite early, or 'Archaic', including the only extensive site at Tiwai Point where there are seven radiocarbon dates which have calibrated age ranges at 2SD from the twelfth to sixteenth centuries A.D. (Anderson 1991). As a shallow, open site in a strategic locality, it is possible that Tiwai Point was occupied on several occasions,

as the radiocarbon dates suggest. If so, perhaps most of the muttonbird bones were deposited much later than the earliest occupation, and later even than the latest dates for the site. This is a point worth testing by obtaining direct collagen dates on a number of the muttonbird bones.

Of North Island sites, the Pond Midden at Black Rocks (Anderson 1979), and Te Awamate (Cassels *et al.* 1988) are late prehistoric in age. In the South Island, the Mapoutahi Pa site, the Fiordland sites and Parangiaio and West Point on Ruapuke Island are probably late sites as well (Anderson and Sutton 1973; Coutts 1972; Coutts and Jurisich 1972).

Turning to historical sources, there is one small case, Stephen's Island, in which a late origin of muttonbirding was clearly asserted. That was stated explicitly by Hipparaiti (1895) who said that while some people had been to the island before him, possibly long before, his first visits occurred before the right time to take the birds had been discovered. A late florescence of the Foveaux Strait industry was argued by Bathgate (1969: 366), on the basis of comments by Wohlers (1881: 133), a missionary resident on Ruapuke Island:

> All the Maoris are very fond of [muttonbirds], and if our Maoris could have sent the preserved birds to the north, they would have received good value in return. But it was too dangerous to sail with heavily loaded boats. This was changed when settlers came to Otago and Southland and shipping came with them. Then our Maoris found that if they took their preserved birds to a merchant in the neighbourhood, they could depend upon their being forwarded to a port near which those Maoris resided to whom they were addressed.

Though Bathgate argued that it was the availability of whaleboats, as opposed to Wohlers' reference to shipping (Wohlers regarded whaleboats as relatively unsafe, though not as dangerous as canoes), that stimulated muttonbirding in the post-European era, the general thesis of increased safety and capacity of transport is plausible. Additional factors in a post-European florescence of the industry might have been the availability of iron pots and salt, and a decline in alternative sources of preserved foods when much of the mainland South Island passed out of Māori control in the mid-nineteenth century (Dacker pers. comm.).

An additional factor in a late growth of systematic muttonbirding, as argued by Coutts (1969: 511), was that the population of Foveaux Strait, especially Ruapuke Island, had increased significantly since the arrival of Europeans. Wohlers did not think so, but no reliable data on the point are available. However, there seem to have been some quite marked shifts of population within Foveaux Strait in the period A.D. 1750–1850, as revealed, for instance, by Boultbee's observations of new settlements on Ruapuke Island and elsewhere and the remark by Edwardson in 1823 that Codfish Island (Whenua hou = new land), had only recently been discovered "...by the natives since they have extended their maritime expeditions" (in McNab 1909: 314). These movements possibly reflected availability of whaleboats (above), or an influx of northern Kai Tahu fleeing tribal warfare in Canterbury. On the other hand, they might have represented no more than the usual residential mobility of the southern hunting-gathering population. In addition, there is one account, recorded by Beattie (1918: 148), which states that it was Kai Tahu, not earlier tribes, who discovered the *tītī* islands. Given the evidence of Archaic Māori artefacts on Ruapuke Island, Stewart Island and the Snares, this can hardly have been literally true, but the story might have been intended to signify the greater importance of muttonbirding to Kai Tahu than to earlier residents of the region.

It is not possible to choose confidently between the alternative hypotheses that systematic, intensive muttonbirding began in Murihiku deep in prehistory or at around the advent of Europeans. My inclination is toward the latter and I suspect that muttonbirding on the historical scale began late in the prehistoric era as other major sources of terrestrial protein disappeared or became scarce: first moas (Dinornithiformes), other large birds and the mainland colonies of procellarids, then the major reserves of forest and open-country birds (pigeons, parrots, rails and ducks) on the mainland under the combined assault of exploitation and environmental degradation, including deforestation. Perhaps the massive reserves of colonial-breeding procellarids on southern offshore islands became worth the undoubted risks of sea and weather at about the point of European discovery. However, until we have some much better archaeological data, particularly from the *tītī* islands, it will not be possible to test these views much further.

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