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BIRDS OF A FEATHER

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MAXIMIZING MINIMUM NUMBERS:
AVIAN REMAINS FROM THE WASHPOOL MIDDEN SITE

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Introduction

During a programme of archaeological work in Palliser Bay from 1969 through 1971, excavations were conducted at about 25 prehistoric sites. A number of these contained midden refuse, and bird remains were fairly common. The largest quantity of avian fragments was recovered from the 65 m^2 excavated at a food processing area at the mouth of the Makotukutuku River, an area locally known as the Washpool (N168-9/22). The stratigraphy of the site is grouped into three cultural levels. Occupation at Level I was centred on about A.D. 1180, Level II at about A.D. 1345 and Level III at about A.D. 1650. The bird remains from this site are used here to document the changing relationships of prehistoric people to their natural environment in the area, and also the manner in which different parts of bird anatomy were treated by this community in selecting some parts as food and others for ornaments and so on. This study owes much to the work of Ron Scarlett who identified the several thousand bird bones recovered. A particular method was used for recording these identifications, and this should be described in full.

Recording Avian Bone Fragments

There are various ways of assessing the number of individuals from bone fragments (for example, Chaplin, 1971:70ff); all of these are fairly time consuming in the case of bird remains, owing to the large number of fragments which can be identified from any one individual bird. The approach suggested here has a number of advantages. On the one hand the method can be consistently applied between different species and this leads to a high degree of comparability. The second feature is that it allows a straightforward analysis of the parts of the body which were retained by prehistoric groups for preservation or immediate consumption. The figures for the different parts of the anatomy also provide an insight into butchering practices.

Figure 8.1 shows the common parts of each limb bone which may be identified. For each fragment an assessment is made whether the shaft portion covers more or less than the mid-shaft position. There are therefore seven different sorts of fragment for each bone.

1. C The complete bone.
2. P The proximal part with only a small part of the shaft.
3. PS The proximal part and more than half of the shaft.

4. S The shaft portion, including the mid-shaft area.

5. DS The distal portion and more than half of the shaft.

6. D The distal portion with only a small part of the shaft.

7. F Small fragments other than those above.

As the bones were identified they were entered on a cyclostyled form shown in Table 8.1. Space is allowed for nine major limb bones (including both sides), and a further eight bones which commonly occur in archaeological sites. The latter eight cannot be coded in any simple way, and common sense must dictate how these fragments are assessed. Of some importance is the sternum, and this has been divided into four fragment types. The rostrum is the small prominence at the anterior end of the sternum. This is often broken off in specimens and can be separately identified.

When a sample of bones is thus processed, Table 8.2 is filled in with the results. An example is given to explain the procedure. One 'minimum number' for the left femur is the addition of the figures in Table 8.1 under C plus P plus PS. Another is C plus D plus DS, and yet another is C plus PS plus DS plus S. Whichever is the greater of these sums is the 'minimum number' for the bone of that side. If only fragments (F) occur, then the minimum number at this point is one. These sums are calculated for the other side, and the final minimum number for the bone is simply the larger of the two numbers. This procedure is followed for each bone including the final eight (no simple rules can be formulated for these fragments). Finally, whichever is the largest number in the right hand column is the maximum minimum number.

Avian Remains at the Washpool

The bird bones from the Washpool Midden Site were processed according to the method outlined above. A minimum number of 273 birds was thus identified, belonging to 45 different species; the basic results are set out in Table 8.3. In Tables 8.4 and 8.5 the same data is organized into taxonomic orders, and in Table 8.6 into habitat types. Size differentiation details are presented in Table 8.7.

These figures show a clear emphasis on the medium and smaller forest birds, and in particular the very mobile flocking birds which characterize mixed forest conditions. In this medium size range are 192 individuals including *Callaeas cinerea wilsoni* (kokako), *Ninox novaeseelandiae* (morepork), *Prosthemadera novaeseelandiae* (tui), *Cyanoramphus novaezelandiae* and *C. auriceps* (parakeets), *Turnagra capensis tanagra* (thrush), *Philesturnus carunculatus rufusater* (saddleback), *Halcyon sancta vagans* (kingfisher), and *Anthornis m. melanura* (bellbird). The kokako, thrush and saddleback are now locally extinct. There are only 20 forest birds in the larger size range and most of them are *Hemiphaga novaeseelandiae* (wood pigeon), although there are also a few *Gallirallus australis greyi* (weka), *Nestor meridionalis septentrionalis* (kaka), and *Heteralocha acutirostris* (extinct huia). Small forest birds include *Petroica australis longipes* (robin), *Rhipidura fuliginosa placabilis* (fantail), and account for only 5 individuals.

Table 8.1 Recording form for avian identifications

Site: N168-9/22 Layer: Lens IIB Species: Cyanoramphus novaezelandiae

Bone	Fragments						
	C	P	PS	S	DS	D	F
L Carpometacarpus	1	1					
R Carpometacarpus	1	2					
L Ulna					1	1	
R Ulna	1	2					
L Radius							
R Radius							
L Humerus	2	6	3		2	4	
R Humerus	2	6	4			8	
L Scapula	2						
R Scapula		1					
L Coracoid	8		1		1	5	
R Coracoid	4	2	4			3	
L Femur	1	2	2				
R Femur		6	1			1	
L Tibiotarsus		3		1	2	8	
R Tibiotarsus		1	1	3	2	1	
L Tarsometatarsus	3	5			4	3	
R Tarsometatarsus	8	2	2	1	3		

	C	C minus rostrum	rostrum	F
Sternum	32	3	8	7

Mandibles Complete 3 Left side 4 Right side

Furcula Complete Left side Right side

Pelvis and Sacrum Complete Fragments 5 (Minimum No = 1)

Skull Fragments (describe) 16 Maxillae, 3 fragments

L Quadrate

R Quadrate

Phalanges

Vertebrae

Total number bones identified = 225

Table 8.2 Computation schema for minimum numbers

Bone	C+P+PS	C+D+DS	C+PS+ DS+S	Minimum Per Side	Minimum Per bone	Maximum Min. No.
L Carpometacarpus	2	1	1	2	3	
R Carpometacarpus	3			3		
L Ulna		2	1	2	3	
R Ulna	3	1	1	3		
L Radius					0	
R Radius						
L Humerus	11	8	7	11	12	
R Humerus	12	10	6	12		
L Scapula	2	2	2	2	2	
R Scapula	1			1		
L Coracoid	9	14	10	14	14	
R Coracoid	10	7	8	10		
L Femur	5	1	3	5	7	
R Femur	7	1	1	7		
L Tibiotarsus	3	10	3	10	10	
R Tibiotarsus	2	3	6	6		
L Tarsometatarsus	8	10	7	10	14	
R Tarsometatarsus	12	11	14	14		
	Sternum				40	40
	Mandible				7	
	Furcula				0	
	Pelvis & Sacrum				1	
	Quadrate				0	
	Phalanges				0	
	Vertebrae				0	
	Skull				16	

There are a number of surprises in the species composition of this assemblage. One unexpected result is that the huia is only poorly represented. Huia were quite numerous, in the nineteenth century, in the Aorangi Mountains which form the hinterland of Palliser Bay, especially in the kanuka areas on spurs and ridges (Stidolph, 1971:17), and their tail feathers were highly prized as a trade item. The small numbers of these birds in the Palliser Bay middens may parallel the nineteenth century situation when they were apparently not eaten by the Maori (Best, 1942:221). Similarly, nineteenth century records indicate that kokako and the saddleback were not prized as food (Best, 1942:378, 380) and these two species are also poorly represented in the site. On the other hand, the robin was deliberately trapped by the nineteenth century Maori, and this bird is a more significant component of the midden. There are possible indications in these parallels of considerable conservatism in bird preferences over a period of seven centuries. At the same time, the weka is comparatively rare in the assemblage and this is unexpected since it was common on the coastal strip in the nineteenth century and also a favoured item of food (Stidolph, 1971). Similarly, swamp birds are uncommon in the assemblages; there is only one harrier hawk (Circus approximans gouldi), one swan (Cygnus sumnerensis), one banded rail (Rallus philippensis assimilis), and only a few ducks (Anas s. superciliosa, and Anas rhynchotis variegata). Several other species such as the white heron are occasional visitors to the Washpool but are not represented in the midden. Again, from the present open ponding condition of the river-mouth, bitterns, dabchicks, and crakes might be expected in the midden. Also birds common on shingle river beds such as the pied stilt, banded dotterel, paradise duck, and pipit are conspicuously absent in the site. These absences may indicate some environmental differences from today's conditions. In fact they may support the conclusion derived from the analysis of shellfish and land-snails that local hydrological conditions deteriorated markedly after a few centuries of human settlement (see B. F. Leach, 1976: Chapter 5). Another surprising feature is the relatively small number of sea birds such as black-backed gulls and shearwaters, the young of which can be easily taken from breeding colonies. It seems likely that modern colonies such as that at North Kawakawa, in Palliser Bay have not been long established. Judging by modern instances, a number of the sea birds which are present in the midden were probably taken as sea-wrecks after the passage of cyclonic storms. In this category are the albatross, shy mollymawk and petrels.

Moa are represented by ten individuals belonging to three species: Pachyornis mappini, Euryapteryx geranoides and E. gravis. It is also possible that some of the fragments could belong to Dinornis sp. The identifications were made by Ron Scarlett, and his overall opinion was that the bone was in fresh green condition when broken rather than from sub-fossil deposits. The remains are very fragmentary, and practically all are from the tibio-tarsus bone. Many of the bone artefacts from the site are made from moa bone, and all indications are that moa presence in the site was not the result of local exploitation of a living population. The most likely interpretation is that the bone was obtained from a population some distance from the Washpool, and was procured by trade or from hunting expeditions during visits elsewhere. A South Island source is a strong possibility since E. gravis was almost certainly not contemporary with man in the North Island. On the other hand it is the most abundant moa in South Island archaeological sites. This could not have been the only source of moa-bone, however, since E. geranoides , a strictly North Island moa, was also present. Clearly these people must have had access either directly or indirectly to a living population in the North Island as well.

The abundance of flocking, honey and berry-eating birds in this site indicates that the occupants of the Washpool had some particularly suitable catching methods. Ethnographic literature of the nineteenth century Maori shows that spears and nooses were used for taking the larger birds such as kaka, tui, and pigeon, and bird spears were a prominent artefact in the site. There are a number of smaller birds, however, which could not have been caught with spears, such as the thrush, robin, parakeet, bellbird, saddleback and fantail. Some quite different method therefore must be suggested, such as snares, set traps, and nooses, and these were also recorded during the nineteenth century. In particular, an effective method of catching parakeets was obviously well developed. Members of the order Psittaciformes are present throughout the high islands of Polynesia, and being social birds are attracted to a decoy. A knowledge of this behaviour, when combined with snares, can be used to advantage in catching the birds. Such a technique could well have been imported to New Zealand. Apart from tui, parakeet, and pigeon, most other birds were recovered in similarly low numbers, and this probably reflects chance catching rather than specially adapted methods.

By far the greatest number of birds was found in Level I, and the sharp decline in Level II may indicate either a decline in fowling or perhaps modification of the environment and reduction in the bird population. The site at Level II still possesses much midden material, so the decline in numbers may be significant. The remains of only two birds were present in Level III. The proportions of different species were compared from Level I to Level II to see if any significant differences could be detected which might shed light on this issue. When the raw data for the two levels is compared using the Chi-square test for two independent samples (qv. Reyment, 1971:53), the resulting difference is shown to be highly significant (see footnote to Table 8.3). If the data is reorganized into taxonomic orders (as in Tables 8.4 and 8.5) there are only three proportions which appear to change significantly between the two levels. The Passeriformes (such as tui, bellbird etc.) have dropped from 44.5% to 25.0%, and this is significant (p= .05, as determined by Rosenbaum's statistic qv, B. F. Leach, 1976: Appendix 35). The main increases detected are the Columbiformes (such as pigeons) from 3.2% to 13.9% (significant p less than .01), and the Procellariiformes (most of the sea birds) which have risen from 2.7% to 11.1% (significant p = .05). The overall difference however, is rather subtle and not easily described in environmental terms. When the frequencies are related to bird habitat categories (Table 8.6), there appears to be a rise in coastal birds at the expense of both forest and forest fringe dwellers, but the significance of the change cannot be proven with the smaller sample size of Level II. Finally, the change may be examined in terms of bird size (Table 8.7). There is a clear change in emphasis in Level II towards the larger birds (significant p less than .05), and this largely reflects the dwindling numbers of Passeriformes. These detected changes are consistent with the gradual loss of forest conditions close at hand.

Table 8.3 Bird remains at the Washpool Midden Site: Minimum numbers. Species arranged in decreasing abundance.

N.B.: Figures in brackets are percentages.

Species	Level I	Level II	Level III	Total
Cyanoramphus ? *sp.*	13 (5.7)	6(13.6)		
Cyanoramphus novaezelandiae	48(21.1)	5(11.4)		
Cyanoramphus auriceps (35.6)	20(8.8)	3(6.8)	(31.8)	95
Prosthemadera novaeseelandiae	77(33.9)	9(20.5)	1(50.0)	87
Hemiphaga novaeseelandiae	7(3.1)	5(11.4)		12
Passeriformes ? *sp.*	7(3.1)			7
Bird ? sp.	1(0.4)	4(9.1)	1(50.0)	6
Petroica australis longipes	4(1.8)			4
Nestor meridionalis septentrionalis	3(1.3)	1(2.3)		4
Turnagra capensis tanagra	3(1.3)			3
Gallirallus australis greyi	2(0.9)	1(2.3)		3
Capellirallus/Rallus ? *sp.*	3(1.3)			3
Coturnix novaezealandiae novaezealandiae	3(1.3)			3
Eudyptes pachyrhynchus pachyrhynchus	3(1.3)			3
Moa ? sp.	1(0.4)	2(4.5)		3
Philesturnus carunculatus rufusater	2(0.9)			2
Callaeas cinerea wilsoni	2(0.9)			2
Euryapteryx geranoides	2(0.9)			2
Euryapteryx gravis	2(0.9)			2
? *Pachyornis mappini/Euryapteryx geranoides*		2(4.5)		2
Anas ? *sp.*	2(0.9)			2
Anas superciliosa superciliosa	2(0.9)			2
Small petrel ? sp.	1(0.4)	1(2.3)		2
Eudyptula minor	2(0.9)			2
Puffinus ? *gavia/huttoni*	1(0.4)	1(2.3)		2
Rhipidura fuliginosa placabilis	1(0.4)			1
Anthornis melanura melanura	1(0.4)			1
Ninox novaeseelandiae novaeseelandiae	1(0.4)			1
Heteralocha acutirostris	1(0.4)			1
Pachyornis mappini	1(0.4)			1
Rallus philippensis assimilis	1(0.4)			1
Circus approximans gouldi	1(0.4)			1
Cygnus sumnerensis		1(2.3)		1
Halcyon sancta vagans	1(0.4)			1
Anas rhynchotis variegata	1(0.4)			1
Diomedea exulans/epomophora		1(2.3)		1
Diomedea cauta	1(0.4)			1

Table 8.3 Cont'd

Species	Level I	Level II	Level III	Total
Larus dominicanus	1(0.4)			1
Phalacrocorax ? sp.	1(0.4)			1
Halobaena caerulea	1(0.4)			1
Petrel ? sp.		1(2.3)		1
Puffinus gavia	1(0.4)			1
Puffinus ? sp.	1(0.4)			1
Eudyptes pachyrhychus sclateri		1(2.3)		1
Eudyptes ? sp.	1(0.4)			1
Totals:	227(100.0)	44	2	273

Chi-square Level I to Level II = 79.1 with 44 degrees of freedom, which is a highly significant difference (p less than .005).

Table 8.4 Bird remains at the Washpool Midden Site—Species arranged into Taxonomic orders.

N. B.: Derived from the figures in Table 8.3.

Order	Level I	Level II	Level III	Total
Dinornithiformes	6	4	-	10
Pachyornis mappini				
Euryapteryx geranoides				
Euryapteryx gravis				
? *Pachyornis mappini*				
Euryapteryx geranoides				
Moa ? sp.				
Procellariiformes	6	4	-	10
Diomedea ? exulans/Epomophora				
Diomedea cauta				
Halobaena caerulea				
Small petrel ? sp.				
Petrel ? sp.				
Puffinus gavia				
Puffinus ? gavia/huttoni				
Puffinus ? sp.				
Sphenisciformes	6	1	-	7
Eudyptes pachyrhynchus pachyrhynchus				
Eudyptes pachyrhynchus sclateri				
Eudyptula minor				
Eudyptes ? sp.				
Pelecaniformes	1	-	-	1
Phalacrocorax ? sp.				
Anseriformes	5	1	-	6
Cygnus sumnerensis				
Anas rhynchotis variegata				
Anas ? sp.				
Anas superciliosa superciliosa				
Falconiformes	1	-	-	1
Circus approximans gouldi				
Galliformes	3	-	-	3
Coturnix novaezealandia				

Table 8.4 Cont'd

Order	Level I	Level II	Level III	Total
Gruiformes	6	1	-	7
Gallirallus australis greyi				
Capellirallus/Rallus ? sp.				
Rallus philippensis assimilis				
Charadriiformes	1	-	-	1
Larus dominicanus				
Columbiformes	7	5	-	12
Hemiphaga novaeseelandiae				
Psittaciformes	84	15	-	99
Nestor meridionalis septentrionalis				
Cyanoramphus novaezelandiae				
Cyanoramphus auriceps				
Cyanoramphus ? sp.				
Strigiformes	1	-	-	1
Ninox novaeseelandiae noveseelandiae				
Coraciiformes	1	-	-	1
Halcyon sancta vagans				
Passeriformes	98	9	1	108
Prosthemadera novaeseelandiae				
Passeriformes ? sp.				
Petroica australis longipes				
Turnagra capensis tanagra				
Philesturnus carunculatus rufusater				
Callaeas cinerea wilsoni				
Rhipidura fuliginosa placabilis				
Anthornis melanura melanura				
Heteralocha acutirostris				
Bird ? genus	1	4	1	6

Table 8.5 Bird remains from the Washpool Midden Site—Proportion in Different Orders (excluding Moa and Bird ? genus—percentages in brackets)

	Level I	Level II	Total
Procellariiformes (petrels etc.)	6(2.7)	4(11.1)	10
Sphenisciformes (penguins)	6(2.7)	1(2.8)	7
Pelicaniformes (shags)	1(0.5)	–	1
Anseriformes (ducks etc,)	5(2.3)	1(2.8)	6
Falconiformes (hawk etc,)	1(0.5)	–	1
Galliformes (quail etc,)	3(1.4)	–	3
Gruiformes (weka etc,)	6(2.7)	1(2.8)	7
Charadriiformes (gulls etc,)	1(0.5)	–	1
Columbiformes (pigeon etc,)	7(3.2)	5(13.9)	12
Psittaciformes (parakeets etc,)	84(38.2)	15(41.7)	99
Strigiformes (morepork etc,)	1(0.5)	–	1
Coraciiformes (kingfisher etc,)	1(0.5)	–	1
Passeriformes (tui etc,)	98(44.5)	9(25.0)	107
Totals:	220(100.0)	36(100.0)	256

Table 8.6 Bird remains from the Washpool Midden Site—Arranged into Habitat Types.

Habitat	Level I	Level II
Forest Dwellers	190(86.4%)	29(80.6%)
Columbiformes		
Psittaciformes		
Strigiformes		
Passeriformes		
Fringe Dwellers	16(7.3%)	2(5.6%)
Anseriformes		
Falconiformes		
Galliformes		
Gruiformes		
Coraciiformes		
Coastal Dwellers	14(6.4%)	5(13.9%)
Procellariiformes		
Sphenisciformes		
Pelecaniformes		
Charadriiformes		
Totals	220(100)	36(100)

Habitat	Level I	Level II
Forest and Fringe Dwellers	206(93.6%)	31(86.1%)
Coastal Dwellers	14(6.4%)	5(13.9%)
Totals	220(100)	36(100)

N.B.: None of the observed differences in proportions above are significant at the 5% level (tested by Rosenbaum's method q.v. B. F. Leach, 1976: App.35).

Table 8.7 Bird remains at the Washpool Midden Site—Arranged into two size groups.

Size Group	Level I	Level II
Larger Birds	41(18.6%)	13(36.1%)
Procellariiformes		
Sphenisciformes		
Pelecaniformes		
Anseriformes		
Falconiformes		
Galliformes		
Gruiformes (minus R. philippensis assimilis)		
Charadriiformes		
Columbiformes		
Nestor meridionalis		
Callaeas cinerea wilsoni		
Heteralocha acutirostris		
Smaller Birds	179(81.4%)	23(63.9%)
Rallus philippensis assimilis		
Cyanoramphus spp.		
Strigiformes		
Coraciiformes		
Passeriformes (minus C. cinerea and H. acutirostris		
Totals:	220	36

Preparation of the Bird Carcass

As shown above, the identification of bird remains followed a procedure which reveals details of the fate of the bird once it was caught. The recorded information is very extensive and only two examples are illustrated here. These are particularly interesting because they may indicate preservation practices, and also the relative importance of meat and feathers to the Washpool people. The examples chosen are the tui (Prosthemadera novaeseelandiae) and the two parakeet species (Cyanoramphus novaezelandiae and C. auriceps). In Tables 8.8 and 8.9 the minimum numbers are given for the major anatomical parts of each bird. As can be seen, the minimum numbers vary considerably for different parts of the body, but very little from the left to right side. The observed bilateral differences proved to be insignificant in the case of both tui and parakeet (see footnotes to Tables 8.8 and 8.9). For easy comparison of the results, the various minimum numbers were standardized as a proportion of the maximum minimum number, and these are plotted out schematically in Figures 8.2 and 8.3.

Evidently there are major differences in the various parts of the bird represented. One obvious possibility is that this reflects either differential survival or uneven ability to identify the discrete parts of the body. However, close inspection of the figures shows that neither of these claims c n be maintained. For example, tui are well represented by such fragile remains as the mandible, which is relatively difficult to speciate; and yet the same bird is very poorly represented by the relatively durable and diagnostic femur. Again, the similar minimum numbers for each side argue that the observed pattern has some additional significance. Some comments must be made, however, on particular bones for which the minimum numbers may be somewhat misleading.

The most difficult bones to assign to species are the phalanges, ribs, vertebrae, quadrate, scapula, furcula, carpometacarpus, radius, ulna and mandible. The carpometacarpus is not particularly diagnostic in shape, while the furcula, which is quite diagnostic, is very small and seldom recovered whole for these small species. Species identification is relatively easy for the tarsometatarsus, tibiotarsus, femur, humerus, pelvis, sternum, coracoid, and cranium, although complications can arise with the sternum, pelvis and cranium due to fragmentation. These factors relating to species identification, however, cannot account for the discrepancy between the pelvis and sternum, which are represented by 6% and 100% respectively in the case of parakeets, and 7% and 100% in the case of tui. Taking into account the few possibly unreliable figures, the main body area of each bird (Figs. 8.2 and 8.3) is conspicuously absent. The line of demarcation between what is well represented, and what is under-represented is very similar for the two species, but there are two notable differences, one in the head region, and the other in the lower leg area. In the case of the tui, the mandible remained at the site, but the cranium was removed with the body; in the case of the parakeet the exact reverse was found. It is precisely in these areas that the most valuable feathers on each bird are found. The male tui has a tuft of long curled white feathers under the mandible and these would be very easily removed by cutting the mandible and upper throat skin away in one slice, perhaps with a piece of obsidian. The skin could then be easily removed from the mandible. The beak area simply marks a convenient point for

Table 8.8 Cyanoramphus spp. from the Washpool Midden Site Level I (minimum numbers for different parts of the anatomy)

Anatomy		Minimum Number	% of Maximum Minimum Number
Carpometacarpus	L	3	4.4
	R	7	10.3
Ulna	L	4	5.9
	R	6	8.8
Radius	L	1	1.5
	R	0	0
Humerus	L	18	26.5
	R	23	33.8
Scapula	L	7	10.3
	R	5	7.4
Coracoid	L	25	36.8
	R	17	25.0
Femur	L	9	13.2
	R	10	14.7
Tibiotarsus	L	17	25.0
	R	12	17.6
Tarsometatarsus	L	25	36.8
	R	30	44.1
Quadrate	L	0	0
	R	0	0
Mandible	L	7	10.3
	R	7	10.3
Cranium and Maxilla		21	30.9
Furcula		1	1.5
Sternum		68	100.0
Vertebrae		7	10.3
Pelvis and sacrum		4	5.9
Phalanges		3	4.4
Ribs		1	1.5

Chi-square from Left to Right = 6.83, with 9 degrees of freedom. Therefore no significant bilateral asymmetry in identifications.

Table 8.9 Prosthemadera novaeseelandiae at the Washpool Midden Site Level I (minimum numbers for different parts of the anatomy)

Anatomy		Minimum Number	% of Maximum Minimum Number
Carpometacarpus	L	5	8.8
	R	6	10.5
Ulna	L	7	12.3
	R	8	14.0
Radius	L	8	14.0
	R	8	14.0
Humerus	L	27	47.4
	R	36	63.2
Scapula	L	15	26.3
	R	15	26.3
Coracoid	L	27	47.4
	R	30	52.6
Femur	L	3	5.3
	R	2	3.5
Tibiotarsus	L	49	86.0
	R	44	77.2
Tarsometatarsus	L	10	17.5
	R	18	31.6
Quadrate	L	2	3.5
	R	3	5.3
Mandible	L	20	35.1
	R	23	40.4
Cranium and Maxilla		3	5.3
Furcula		6	10.5
Sternum		57	100.0
Vertebrae		2	3.5
Pelvis and sacrum		4	7.0
Phalanges		3	5.3
Ribs		1	1.8

Chi-square from Left to Right = 3.68, with 10 degrees of freedom. Therefore no significant bilateral asymmetry in identification.

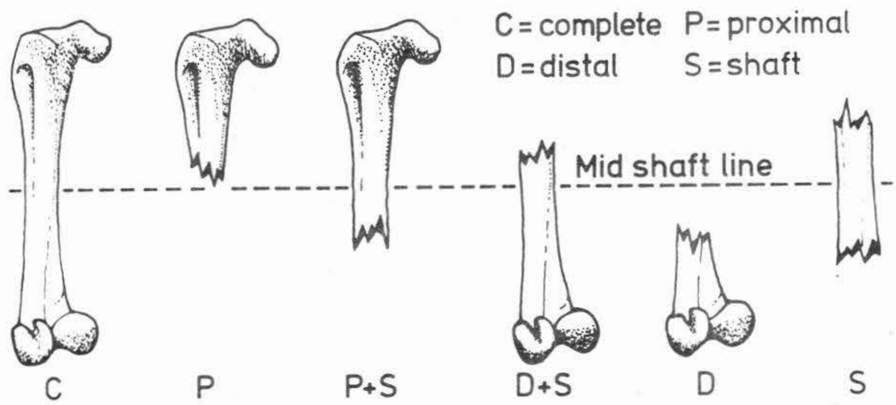

Fig. 8.1 Avian limb bone fragments recorded.

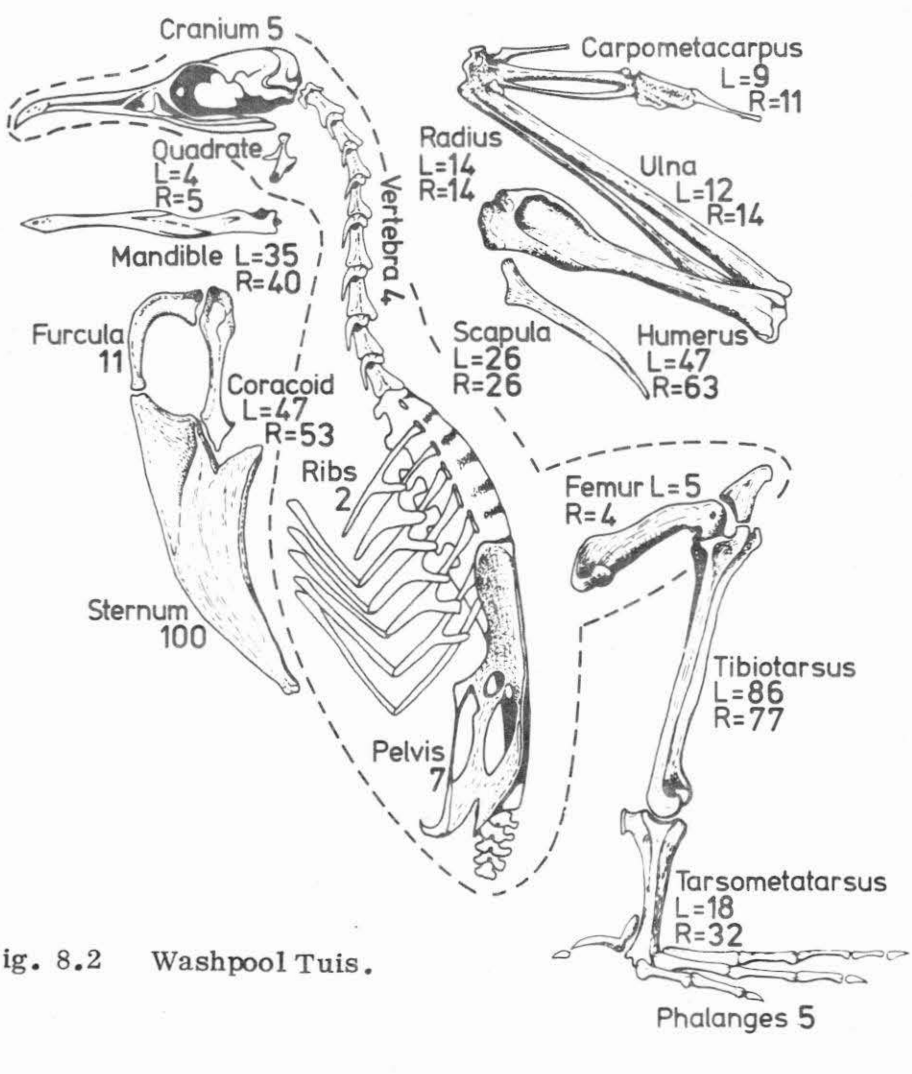

Fig. 8.2 Washpool Tuis.

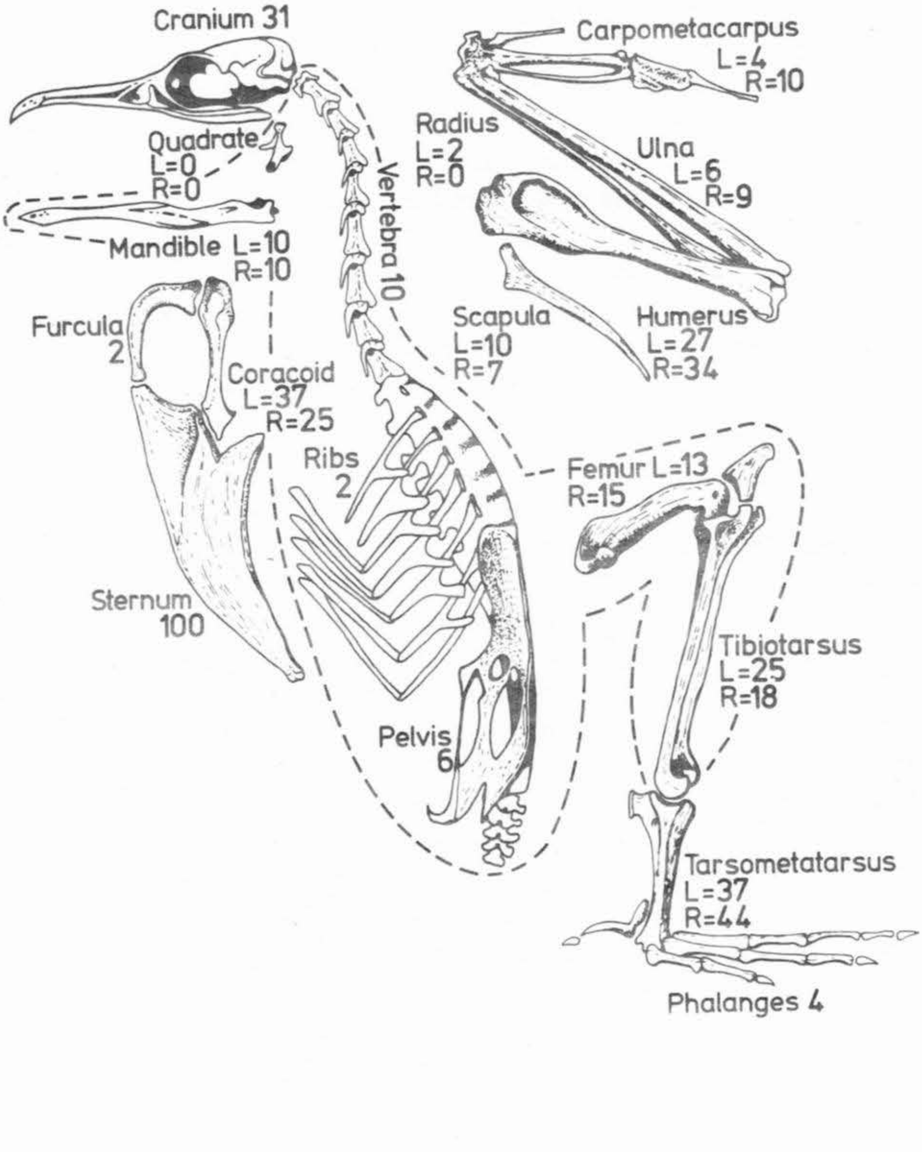

Fig. 8.3 Washpool Parakeets.

beginning the cut. The red and yellow-crowned parakeets, on the other hand, have what their common names imply, an area of red and yellow feathers on the top of their heads. Removal of these may have involved a similar process as in the tui (cutting at the back of the beak area) but this time removing the cranium from the rest of the body.

The second notable difference is in the lower leg region. The tui tibiotarsus (and the rest of the lower leg) stayed at the site, and the femora were removed with the body, whereas the demarcation line in the parakeet is a joint lower. Only the leg from the tarsometatarsus down remained at the site. This difference is explicable by reference to the outward appearance of each bird. The tui, a hopping bird, has practically no meat or feathers from the tibiotarsus down, and the obvious place to cut and discard the leg is at this point. The parakeet, however, is a walking bird, and has more muscle and feathers on the tibiotarsus; thus the obvious dividing line is one joint below that of the tui. It is suggested then that one of the operations involved in preparing these bird carcasses was to 'top and tail' them, as is done today, and the appropriate parts saved and discarded were determined by the presence of valuable feathers in the head area, and the presence of meat in the leg region.

The following interpretation is offered as a likely explanation of the observed patterns. When the tui were processed at the site the useless lower leg portion was cut off and discarded on to the midden. Then the lower beak (of the males) was sliced off with the piece of throat skin to which the white tuft of feathers was attached. Taking the mandible with the skin was for convenience of cutting only, for it was then cut from the throat skin and also thrown on to the midden. The wings were removed next, along with the sternum and the rest of the shoulder girdle. This contains a large portion of the meat of the bird and could only be removed with some tearing action as well as cutting. Presumably this part was eaten on the spot before discarding, for it also found its way on to the midden. The rest of the bird, which includes the drumsticks, and the remainder of the body cavity along with intestines, was removed from the site, perhaps preserved in fat for trading or eating elsewhere. The procedure applied to the parakeet must have been very similar except that the head was removed for its feathers, the skin presumably taken off separately, and the cranial bones discarded on the midden. The tibiotarsus was left on the body as having more useful meat than the tui.

Conclusion

The bird bones deposited at the Washpool midden site provide an insight into the nature of the surrounding environment and man's influence upon it over a period of about five hundred years, as well as the manner in which birds were treated as items of food and as a source of decorative feathers. Thus, these remains, in common with other types of economic debris, can form a prime source of information on natural history as well as culture history. Anyone who has worked with bird bones will realise what a tantalizing medium they present. Identifications are fairly difficult, and many must be made to achieve a 'minimum number' of even one. Even though the rewards of these labours always appear worthwhile in retrospect, it is important for archaeologists to be continually striving to maximize the return of information from this work. Ron Scarlett has contributed a great deal to this quest over the years by maintaining a high quality and an incomparable quantity of identifications for archaeologists. Above all, he has steadfastly demanded that even tiny fragments be included in any material sent to him. The documention of these fragments from the Washpool has helped uncover aspects of behaviour which would not have been possible by a more conventional analysis.

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