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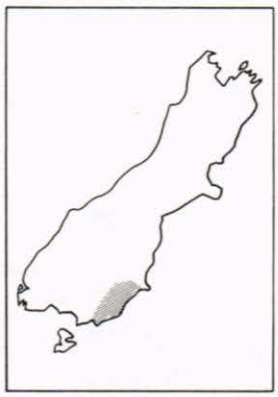
THE FIRST THOUSAND YEARS

Regional Perspectives in New Zealand Archaeology

Edited by Nigel Prickett

SOUTH OTAGO

Jill Hamel



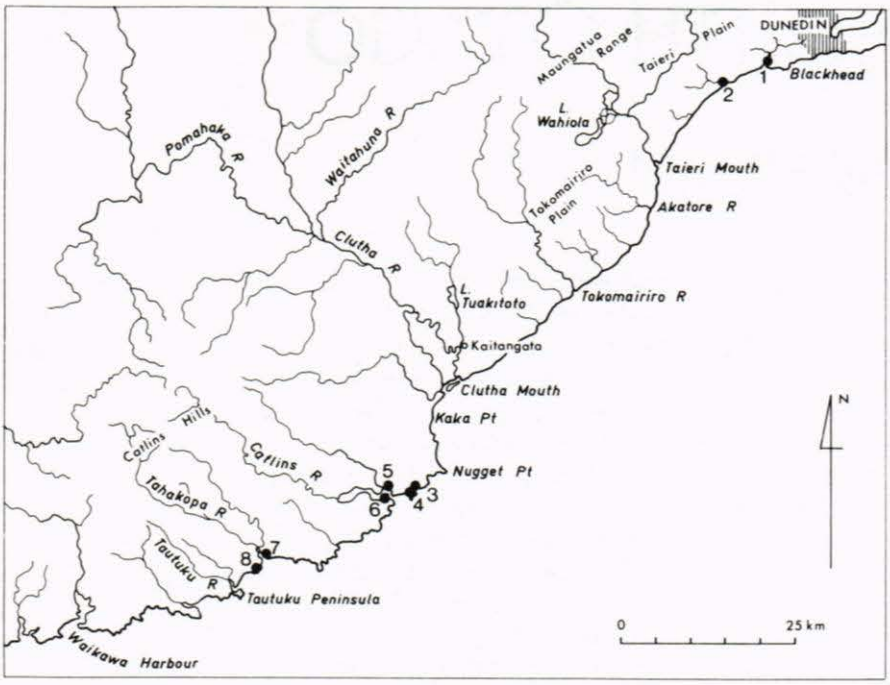
The region to be considered in this chapter is the coastal strip immediately south of Dunedin to Waikawa Harbour (Fig.8.1). It will be useful to take into account the vegetation, geography and geology for about 20 km inland along this stretch of coast as a background to the prehistoric settlement pattern.

North of the Clutha River mouth the coastline has a generally low but rocky profile, backed by coastal terraces, rising to gently rolling hills and falling inland to the Taieri and Tokomairiro Plains. South of the Clutha mouth there is a dramatic change to high cliffs and headlands alternating with the long sandy beaches of the Catlins region. In part this difference is due to a change from the relatively homogeneous schist and Permian greywackes in the north to the sharply folded Jurassic-Triassic sediments with their alternating bands of soft and hard sedimentary rocks of the Southland geosyncline.[1] This change was of particular significance to prehistoric populations since the schist region includes other rocks, such as Tertiary volcanics around Dunedin, and porcellanite and silcretes inland to the north and west — rocks which are suitable for flaking — whereas the Catlins area does not seem to have any rock which will take a conchoidal fracture and which could have been used for tools.

There is also a dramatic contrast between the climate and natural vegetation of the two sections of the coastline. North of the Clutha mouth rainfall tends to be so low that the original forest was at the best a narrow strip of broadleaf-podocarp forest along the coastal slopes and gullies, with open kanuka forest behind it. By the early 19th century, this forest was reduced to numerous discrete patches. The colder boggy flats of the Tokomairiro and Taieri Plains probably never carried continuous forest. South of the Clutha River rainfall is high enough to support dense podocarp-kamahi forest which, combined with steep ridges and swampy valley floors, created a difficult topography for foot travellers. It is possible to view this southern block of forested hills as a barrier between the coastal settlements and the inland rock and food resources, which would have had a significant impact on the prehistory of the area.

The first account of prehistoric sites on this whole length of coastline is given by von Haast[2] who described the two related sites at the mouths of the Otokai (Brighton) and Kaikorai Creeks.

After von Haast, there was no scientific study of the prehistory of these coasts until the 1930s. During this time, however, Maori sites were being fossicked and discussed by Europeans.[3] Road gangs putting in coach roads on the Catlins coast around A.D. 1900 dug over sites near Long Point, and fortunately missed the very large site at Papatowai Point. When David Teviotdale in the 1930s, at the instigation of H. D. Skinner of the Otago Museum, explored the Catlins coast, he found several middens rich in artefacts. Teviotdale carried out three separate excavations at Papatowai Point to obtain associated artefacts and moa bones for



8.1 Map showing location of major archaeological sites in the South Otago region. Numbered sites are: 1. Kaikorai Creek; 2. Brighton; 3. Cannibal Bay; 4. False Island; 5. Pounawea; 6. Hinahina; 7. Papatowai; 8. Kings Rock.

the Otago Museum. Though Teviotdale lacked formal training in archaeology, he noted in his diaries and published papers the general nature of the stratigraphy and some of the associations of bone, shell and artefacts at Papatowai.[4] The distinctively stratified middens of Papatowai Point subsequently stimulated Lockerbie, who worked with Teviotdale, to develop methods of stratigraphic provenancing of artefacts. His publication of his own excavation at Papatowai[5] was the first in New Zealand archaeology to show stratigraphical positions of major artefacts. Lockerbie was also associated with early efforts to develop radiocarbon dating in New Zealand, and both midden and natural materials from the Catlins were extensively used in the 1950s by the Nuclear Sciences Institute of the D.S.I.R. The material excavated by Teviotdale and Lockerbie played an important part in Golson's formulation of a Murihiku Archaic assemblage[6] and his efforts to make historic sense of the development of Archaic and Classic assemblages in Otago using the imperfect radiocarbon dates of the period.

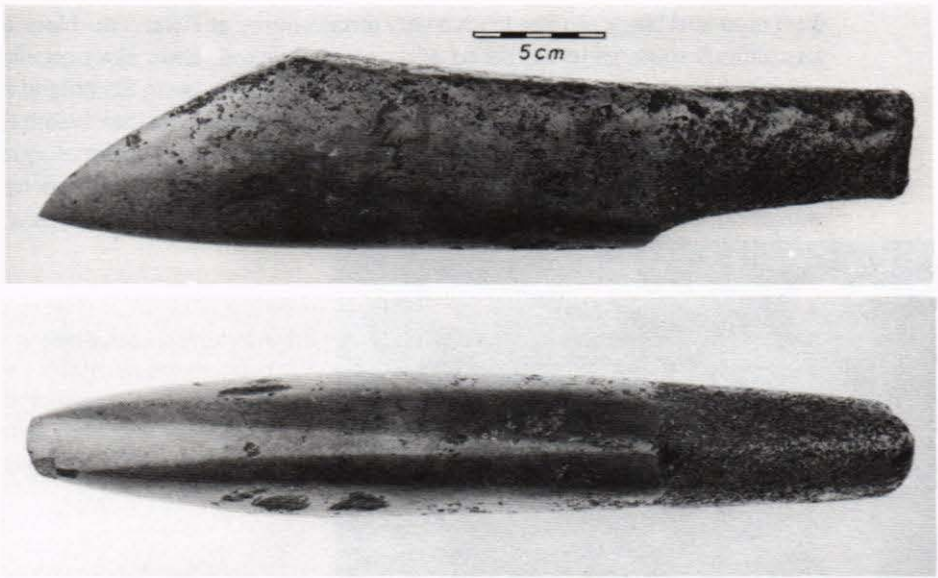
In 1959 Lockerbie[7] published some further material on Pounawea in his synthesis of Murihiku prehistory, and during the 1970s examination of the settlement pattern and associated palaeo-environment of the Catlins coast[8] led to further excavations at Papatowai and Pounawea,[9] during which more attention was given to the retrieval and analysis of large, well-provenanced samples of faunal material.

There has been very little archaeological investigation of the coastline between Dunedin and the mouth of the Clutha River. There has been a small excavation of von Haast's site at the Kaikorai Creek mouth,[10] another in a cave at the Taieri mouth[11] and some unpublished collecting at a moa hunter site on the north side of the Taieri River mouth. The only other work done has been a site survey[12] along the beach edge from Blackhead to the Clutha River.

Dating

Provenanced radiocarbon dates for this region have been obtained only from the Catlins sites, and the best series come from the two major river mouth sites of Papatowai and Pounawea. The first coherent series from Pounawea and Papatowai[13] included dates from bone carbonate and require re-interpretation since Polach[14] showed that bone carbonate can equilibrate isotopically with soil carbonate in a well-drained sandy matrix typical of the Catlins middens. When all the series of dates are examined it becomes apparent that there is only one reliable date,[15] a shell date from Pounawea, that is post A.D. 1500. For Papatowai there is now a coherent provenanced series of twelve dates from charcoal, spread from A.D. 1060 ± 80 to A.D. 1370 ± 60.[16] For Pounawea there is a coherent series from shell, moa bone and charcoal of fifteen dates spread from A.D. 1140 ± 70 to A.D. 1450 ± 60.[17]

The only Catlins radiocarbon dates which are both reliable and younger than A.D. 1500 are the group from False Island and Cannibal Bay on fish bone and charcoal ranging from A.D. 1630 ± 50 to A.D. 1735 ± 50.[18] These latter dates come from small shell middens and ovens and are associated with a different range of artefacts compared to the river mouth sites of Pounawea and Papatowai. From the radiocarbon dating it seems unlikely that the major river mouth sites in the Catlins were occupied after A.D. 1500.

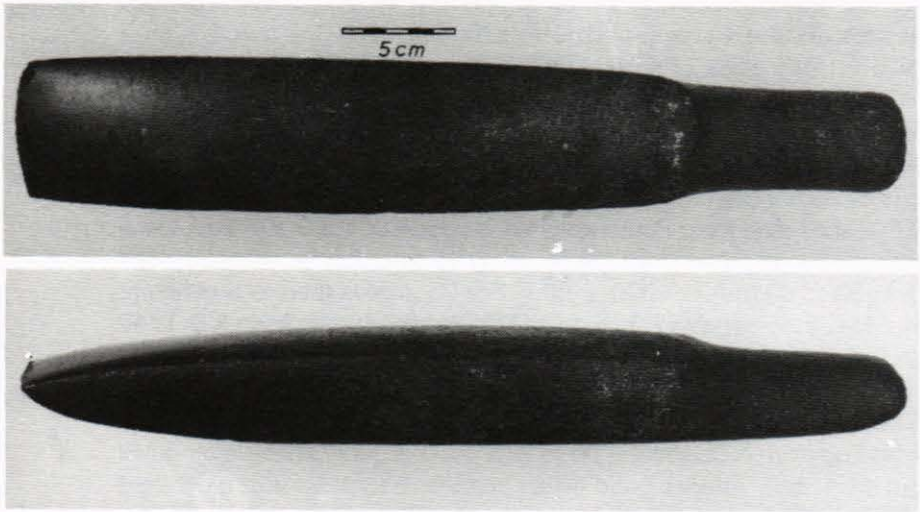


8.2 A heavy hog-back adze from Owaka, South Otago (Otago Museum).

Archaic material culture

The stone and bone tool assemblages typified as Archaic in Murihiku are described by Anderson (this volume) for North and Central Otago. The large silcrete blades, hogback and heavy quadrangular adzes (Figs 8.2 and 8.3), ulu-type slate knives, bone and Dentalium reel ornaments, unbarbed one-piece fish-hooks (occasionally made in two parts, Fig.8.4), and a variety of minnow lures are the typical artefacts of the Catlins middens.

Since there was no flakeable stone along the Catlins coast, all flaked tools were made of imported materials, and even some of the files were of a type of schist which does not occur south of the Clutha River mouth. An assemblage of 1200 stone tools and flakes from Pounawea[19] were made mostly from silcrete, porcellanite and argillites, the silcrete and porcellanite coming from inland Southland and Central Otago and the argillites mostly from Southland. These argillites included green argillites from Bluff Harbour and Riverton, grey argillite from the



8.3 A heavy quadrangular adze from Southland, typical of Archaic adzes found in coastal south Otago (Otago Museum).

Bluff area and black argillite from a very small source at Tiwai. This black argillite was difficult material to work into adzes since it flaked rather like porcellanite.[20]

Among the broken adzes at Pounawea, it was only those in Southland argillite which had been reworked, as if this was the only rock material that the inhabitants felt confident about working. Other rock materials present in small quantities were D'Urville Island argillite, North Island obsidian and West Otago nephrite, indicating the presence of a long distance trading network. There is a rough

8.4 A large fish hook made from moa bone, in the form of a one-piece fish hook but constructed in two parts. This specimen came from the upper shelly layer of Pounawea, S184/1.

similarity in the selection of rock types used at more northern sites. At Brighton and Kaikorai Creek, a local basalt[21] was used to make typically Archaic roughouts.[22] Also present in the Otago Museum collections from Kaikorai Creek are tools of silcrete and some porcellanite, chalcedony, Southland argillites, a little D'Urville argillite, nephrite and obsidian.

One of the notable artefacts of the southern Archaic assemblages is the long and massive silcrete blade, struck from a prepared prismatic core and often snapped into almost square sections (see Fig.7.7). Anderson considers the problems posed by postulating a local tradition of blade making, contrasted with an undemonstrated trans-oceanic succession of blade technologies. The technology of blade manufacture can be demonstrated for inland Central Otago sites, coastal North Otago sites and as a part of adze manufacturing at Riverton on Foveaux Strait.[23] The presence of not only the blades but also the massive silcrete cores from which they were struck, both at Kaikorai Creek[24] and at Pounawea,[25] shows that this tradition was present along the entire Otago coast. Its continuity into the 19th century and Classic assemblages as a technique (but not for making silcrete blades) indicates we must distinguish between the Archaic silcrete blades *per se* and the techniques used in blade making which are found throughout the whole prehistoric period.

The range of activities indicated by the tools found at the major sites include the working of heavy and light timbers, butchering of large animals, the working of skins and wood with scrapers of various shapes and sizes, line fishing with lures and bait hooks, picking and piercing of textiles and skins with awls of various weights and the preparation of bone tools with files, grinders and stone drills. The well-documented assemblage of artefacts from Pounawea is notably lacking in those objects with ground edges described as attrition saws. It can be assumed that the sawing of bone for fish hook tabs and for reels was done with the general-purpose sharp flake or a silcrete blade. Since there was little or no nephrite in the Archaic sites, it might be considered that there was little need for carefully prepared attrition saws. The only doubt that should be expressed here is in the distinction between ulus and attrition saws. Examination of museum collections suggests an overlap in the two categories as defined by different workers, particularly when the object is apparently broken. Sometimes they are listed simply as scrapers,[26] a commonly ascribed function of the ulu.[27]

In summary, the types of stone and bone tools used by the earliest occupants of the South Otago coast are fairly well known, but nothing is known of their wooden tools and utensils and very little about how woodworking tools were employed. Though various general functions of some of the tools can be reasonably deduced, e.g. heavy adzes used for heavy woodworking, these tools may have been commonly used for other purposes as well. Since the mode of use of these tools could tell us much about patterns of social behaviour, we now need to give increasing attention to analyses of wear patterns and of traces of residues, as well as to experimental work making and using similar tools.[28]

Economy and settlement pattern in the Archaic Phase

The largest midden sites of the South Otago coast have been found at the mouths of the Taieri, Clutha, Catlins, Tahakopa and Tautuku Rivers with one exception, the site of Cannibal Bay. Judging by the extent of wind-eroded material in the dunes, Cannibal Bay was the largest early site between the Waitaki River mouth and Tiwai Point, stretching for at least 0.5 km through the sheltered dunes behind False Island. Other sites rarely extend for more than 50 m, and all lie on well-drained, consolidated or eroding sand dunes. There are no defended or even deliberately terraced sites — most sites would have been difficult to defend either from the land or the seaward side.

Choice of site location was strongly affected by access to a variety of food

sources, the major ones being forest and shoreline birds, marine mammals, fish of inshore waters (mostly barracouta), soft shore shellfish (Table 1) and presumably the bracken, cabbage trees and soft greens that tend to grow in the disturbed alluvial soils of the river edges. The other important source of food and industrial bone, the dog, also had to be fed from these sources. To have regular access to fur seals, the sites needed to be within hunting distance of seal breeding colonies, which at present are always on broken rocky shorelines where the young pups can obtain shelter in rock crevices. This may have been a major factor in the atypical location of the Cannibal Bay site.

The large sites have all contained moa bone, and in some, such as Papatowai, moa bone was abundant. At every early site investigated with the possible exception of Kaka Point,[29] seal bone has also been an important component, mostly from the two species of eared seals, fur seal *(Arctocephalus forsteri)* and sea lion *(Phocarctos hookeri)*. At Pounawea the proportion of seal to moa was about 3:2,[30] but at Papatowai there were proprtionally more moa — five to every four seals. The Catlins sites also tended to have a wide range of species of moa and not just the middle-sized species common in the North Otago sites.

The only sites between the Clutha River and Dunedin known to contain moa bones were Kaikorai Creek, from which *Euryapteryx gravis* was identified,[31] and a small cave at Taieri Mouth containing only a few fragments of moa bone and moa eggshell in a midden layer.[32] Other finds a moa bone along this coast have not been definetely associated with midden material and may have been of natural origin. The site on the north side of the Taieri River mouth is also likely to have been an Archaic settlement, but documentation of this site is too poor for us to be certain of its nature. However, there is no reason to assume a lack of Archaic settlements along this part of the coast.

Between the main river mouths small middens are very numerous, consisting mostly of lenses of charcoal, shell and fish bone about 3-6 cm deep and 1-5 m long. They occur regularly at the mouths of small streams and occasionally in between. If they contain any artefacts at all, these are usually small general-purpose flakes of porcellanite or silcrete which are of little use in determining the period of occupation. These small sites need not belong exclusively to either the Archaic or Classic periods. The nature of the coastal food resources would have enforced mobility on any hunter-gatherer society, as suggested for the Archaic period by the rock types found at Pounawea and for the Contact period by European descriptions.[33] The small middens are likely to have been the result of overnight camping by parties travelling between the major settlements throughout the prehistoric period.

It is only for some categories of food in certain sorts of deposits that we can estimate the relative importance of different food resources. At coastal sites large shell middens have accumulated and these provide suitable conditions for preserving even small bones such as those of fish, forest birds and rats. Accordingly, at a site such as Pounawea it is possible to estimate relative numbers of each of certain food species. From Table 1, it is apparent that shellfish, fish, small birds, moas and marine mammals each contributed substantially to the food intake of the inhabitants of Pounawea. The importance of plant foods is not known, however, nor is it known how the foods of lakes and inland rivers, i.e. eels, lampreys, freshwater lobsters, freshwater mussels and wetland birds were fitted into the yearly round of food gathering. Though ovens are not uncommon along rivers and lakes adjacent to the Otago coast, food residues have not been found in or around those which have been examined.[34]

The inland lake systems of Tuakitoto, Waihola and Waipori are very rich in eels, freshwater mussels and wetland birds but no site surveys have been done around

Table 1:

Minimum numbers of individuals of animals in the three major stratigraphic units at Pounawea. These units represent different activity areas of one type of occupation pattern rather than changes in food gathering habits over time.

	Layer 1	Layer 2	Layer 1/2
Shellfish	40920	3680	9300
Barracouta	307	5	56
Other fish sp.	39	10	14
Small birds	33	58	34
Moas	3	7	3
Seals (3 spp.)	6	11	8
Dogs	4	7	6
Rats	4	5	1

them. There are substantial collections of adzes from Waihola and Waipori in the Otago Museum including Archaic forms.[35] It would be unwise, therefore, to assume that settlement was concentrated on the coastal edge of this region with only occasional forays inland to Central Otago. Certainly no moa hunter sites such as are found in Central Otago at Hawksburn, Millers Flat or the Old Man Range have been found in the belt of hills and plains immediately behind the South Otago coast. Nor does it seem likely that this is just an accident of preservation (or rather of non-preservation), since moa bone on the surface has survived in at least fragmentary form at Hawksburn, where the effects of freezing and dessication are much greater than in the coastal region.

On present evidence we have to assume that during the Archaic period moas were hunted at many sites along the coastal fringes of the forests and at a few sites deep inland in Central Otago, but not in the area between these two regions. This could indicate a paucity of moas in such areas as the Taieri and Tokomairiro wetlands, or alternatively the Maoris may have chosen not to hunt moas in wetlands but to concentrate instead on trapping eels and other wetland species.

Contact period and Classic tool types

When Europeans arrived in Otago they documented Maori occupation at Otakou, the Taieri Mouth, Kaka Point and then away to the south at Waikawa Harbour. Shortland[36] mentions a track which was used by the Maoris prior to their acquisition of whaleboats, which ran from the head of the Otago Harbour south down the Taieri and Tokomairiro Plains to Kaka Point. Another track ran inland from the Clutha River mouth to Tuturau and thence south to Foveaux Strait, but there are no accounts of tracks or settlements along the Catlins coast. Apparently in the early 19th century there was no regular exploitation of the 50 km of coast from the Nuggets to Waikawa Harbour. The only known exceptions were occasional fishing expeditions from the Clutha River mouth area to False Island.

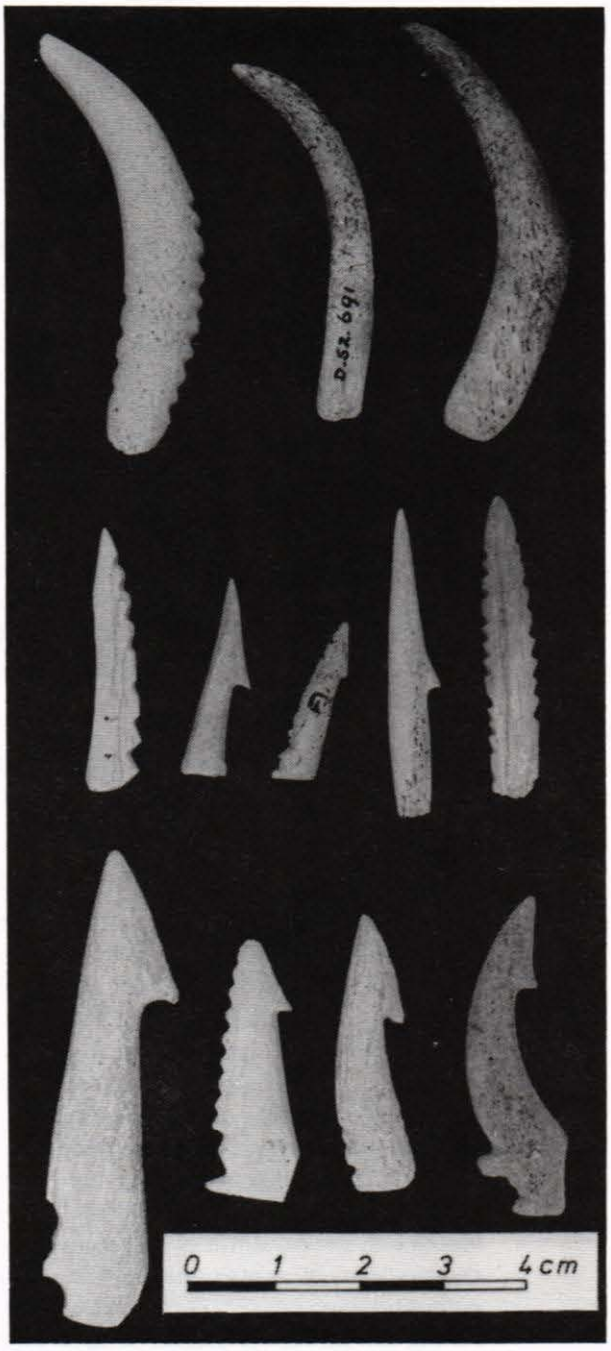
On the northern section of the coastline, the settlements seen during the Contact period varied from a few huts, often deserted,[37] to substantial villages such as Murikauhaka at Kaka Point. The latter was described by an American sealer, Morrell, in 1830[38] as consisting of 28 huts, the largest of which were '30 ft long and 12 ft broad', strongly constructed and painted black and red. Obviously these were permanent buildings in the sense that they were built to last several years even if they were not occupied continuously. Morrell also mentioned that 50 natives came out to visit his ship in Molyneux Bay — quite a large group of people for a hunter-gatherer settlement.[39]

The other known settlements of the Contact period along this coastline were three whaling stations: at Taieri Island, near the mouth of the Clutha River and

Tautuku Peninsula. The first two were close to documented Maori settlements of the time (Taieri Mouth and Murikauhaka), but there is no evidence for a purely Maori settlement at Tautuku in the early 19th century. The surveyor, Tuckett,[40] described the Maoris at the whaling station as mostly dependants of the whalers, and commented that two recently orphaned children had land rights at Otakou. The sealer, Boultbee, coasting with a party of Maoris from Waikawa to the Clutha River mouth in 1828 mentioned only the sites of old settlements from which he was forbidden to collect fresh 'greens' when the party camped ashore overnight. He gives no indication of any inhabited settlement or even of deserted huts.[41]

8.5 False Island from the west, showing the main Cannibal Bay site in the lighter patch of dunes to the left.

The other significant evidence for the abandonment of the Catlins coast about A.D. 1500 is the lack of Classic style artefacts except at the False Island/Cannibal Bay group of sites (see Fig.8.5) and at Kings Rock. The elaborate barbed and notched composite hook points, nephrite adzes and pendants, incised sections and flutes of albatross wing bone and the general use of human bone for artefacts, which apparently arrived from the north about A.D. 1650,[42] are not characteristic of any of the Catlins sites. There are occasional occurrences of these artefact types but it is only among the False Island (Fig.8.6), Cannibal Bay and Kings Rock fish hook material that there is regular occurrence of one group of Classic artefacts, the barbed and notched composite hook points.[43] The sites in the False Island/Cannibal Bay area include several small middens around the periphery of False Island and the very extensive site in the back dunes of Cannibal Bay proper, a site which may include Lockerbie's Cannibal Bay and his False Island sand dune sites,[44] from which dates have been obtained. It is possible to ascribe specifically Archaic types such as a bone reel necklace and large flake knives to the large dune site,[45] but it is not possible to be so certain of the provenance of the fish hooks deposited in the Otago Museum and described by Hjarno[46] as coming simply from Cannibal Bay. It is quite feasible that at some stage Classic material was deposited on and among the Archaic material of the main dune site as well as at the small middens high on False Island, one of which was excavated in part by Trotter[47] and dated by Lockerbie.[48]



8.6 Notched and barbed composite hook points from False Island, a representative group of shapes (Otago Museum).

The evidence for Classic occupation of the South Otago coast is of quite a different nature from that of the coastline north of Dunedin. There have been no major excavations to provide us with the large assemblages of Classic artefacts typical of Long Beach, Tarewai Point and the upper layers of Little Papanui. Instead, evidence of occupation consists of records of early European visitors who described houses, numbers of people and the location of settlements and tracks.

One of the imponderables of the environment between Dunedin and the Clutha River is the rate and timing of reduction in forest cover. Sub-fossil log remains have not been recovered from the coastal hill range, but dating of logs from non-forested areas above 500 m on the Maungatua and Silverpeak hills

indicate destruction of those forests during the 13th and 14th centuries.[49] Forest destruction on the drier and lower coastal ranges probably began earlier during the period of Maori occupation, but it is unlikely to have been a steady process. Podocarp and broadleaved forest did remain, however, in the seaward gullies of the coastal hills and on the coastal terraces south of Dunedin until the arrival of Europeans, and would have provided a substantial source of birds, timber and other useful commodities.

It is likely, therefore, that the same food species were available on both the northern part of the coastline and on the Catlins coast, though probably in differing proportions. Ecologically the Catlins forest offered a richer habitat in the 16th century for forest birds, and its coastline provided better hauling-out grounds for seals, but the shellfish and fish populations should not have differed significantly from those to the north. Two resources which would have been markedly more abundant in the northern section were bracken and cabbage trees. The drier and more open vegetation of the northern coast would have then, as it does at present, supported more of these two species, and it would have been easier to induce their increase by burning the forest off the exposed ridges and hill tops. Unfortunately we do not know if the bracken and cabbage trees growing on exposed sites produced rhizomes that were considered edible by the Maoris. Another interesting factor is that dried foods would have been easier to store for winter use under the lower rainfall of the northern coast.

Conclusions

The basic pattern of prehistory along the coast from Dunedin to Waikawa Harbour was similar to that of North and Central Otago until about the 15th century. With the deforestation of the northern coastline and Central Otago and the extinction of moas throughout Otago and Southland about A.D. 1500, the forested coastline of the Catlins was no longer a desirable place to live. The pattern of settlement changed. The occupants of Murihiku now found it more economic to live along the coastline from the Clutha River northward, where the food resources were similar to those of the Catlins but where less energy was required to reach the inland rock resources of nephrite, porcellanite and silcrete as well as such foods as eels, fern and cabbage tree. Prior to A.D. 1500, it was only the presence of a variety of species of moas in large numbers that had made occupation of the Catlins coastline worthwhile. The northern coastline also had the added advantage over the Catlins of having some sources of flakeable rock close to the shoreline, as at Brighton.

It is difficult to determine the nature in the change in use pattern of the South Otago coastline around A.D. 1500. If the river mouth sites of the Catlins were visited only during summer and autumn, which is a possible interpretation of the seasonal indicators at Pounawea,[50] the only change in the seasonal round of food gathering after A.D. 1500 may have been occupation of summer and autumn fishing camps along Foveaux Strait or north of the Clutha Mouth instead of along the Catlins coast. From these camps the same food resources as in the Catlins of the 11th-15th centuries could have been exploited with the exception of the now extinct moas. This poses questions about carrying capacity and whether or not there was room for extra people at these other summer settlements. Or did the population density decline?

Many of the uncertainties in South Otago prehistory centre on population densities, a subject about which we know very little. Not only do we need to know more about changes in population densities over time between the Archaic and Classic, we also need to know more about correlated changes in population densities in Marlborough and Canterbury. All the Maori traditions about population movements in the South Island involve a north to south flow, i.e. from the areas where crops could be grown to where people had to follow a completely

hunter-gatherer way of life. It was a movement from places of higher population density, judging by the site densities of Marlborough and Nelson, to an area of lower population density in Murihiku and from a settlement pattern involving the construction of defended sites to an area where defended sites were not considered necessary. In recent years archaeologists have been developing new ideas about how agriculture began on a world-wide scale eight to ten millenia ago. The subjects of interest are the attitudes of early agriculturalists to the cultivation of crops and to the control of their own populations.

Given a choice between the hard work of growing crops and raising many babies or the lesser work of not growing crops and raising fewer babies, what did people with a stone technology do? In New Zealand we have a group of people with a reasonably homogeneous culture extending along a continuum from intensive gardening in Auckland to an apparently completely hunting and gathering way of life in Murihiku. We can assume that the first occupants and successive invaders of Murihiku brought with them such characteristics of agriculturalists as a stratified tribal society ruled by paramount chiefs,[51] a belief in the efficiency of the defended pa as a means of resolving conflict and a range of conscious and unconscious means of population control,[52] quite different from those of hunter-gatherers. Exploration of the changes in these characteristics within the environment of Murihiku might well be used to test hypotheses developed elsewhere about the evolution of agriculture generally.

Notes

1. New Zealand Geological Survey, 1961.
2. von Haast, 1879.
3. Roberts, 1895.
4. Teviotdale, 1937, 1938a, 1938b.
5. Lockerbie, 1953.
6. Golson, 1959.
7. Lockerbie, 1959.
8. Hamel, 1977a.
9. Hamel, 1980.
10. Harding, 1957.
11. Teviotdale, 1940.
12. Teal, 1977.
13. Lockerbie, 1959, p. 106.
14. Polach, 1972.
15. Lockerbie, 1959, p. 106 (NZ 54).
16. Hamel, 1978. Old half life values used throughout. Series NZ 1332-1333, NZ 4267-4272.
17. Lockerbie, pers. comm.
18. Fergusson and Rafter, 1959. Series NZ 143-148.
19. Hamel, 1980.
20. Megan Huffadine, pers. comm.
21. von Haast, 1879.
22. Helen Leach, pers. comm.
23. Leach and Leach, 1980.
24. Otago Museum, accession number D31.1396.
25. Hamel, 1980.
26. Lockerbie, 1953, p. 21.
27. Skinner, 1974, p. 115.
28. Steele, 1930.
29. George, 1944.
30. Hamel, 1978.
31. Identified by W. R. B. Oliver. See Harding, 1957, p. 101.

32. Teviotdale, 1931.
33. Begg and Begg, 1979; Bathgate, 1969a, p. 276.
34. Hamel, 1977a.
35. There is also a massive silcrete blade, 30 cm long, from Waihola (Otago Museum accession number D33.2126).
36. Shortland, 1844.
37. Shortland, 1844. At Taieri Mouth.
38. In McNab, 1907, p. 263.
39. McNab, 1907, p. 264.
40. Tuckett, 1844.
41. Begg and Begg, 1979, p. 104.
42. Leach and Hamel, 1978.
43. Hjarno, 1967; Simmons, 1967.
44. Lockerbie, 1959, p. 88.
45. Lockerbie, 1959, p. 88.
46. Hjarno, 1967.
47. Trotter, 1957.
48. Fergusson and Rafter, 1959.
49. Molloy *et al,* 1963.
50. Hamel, 1980.
51. Anderson, 1980b.
52. Phillipps, 1980.