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# ARCHAEOLOGICAL RESEARCH IN EASTERN GOLDEN BAY: AN INTERIM REPORT

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The archaeological landscape of Golden Bay in the northern South Island incorporates stone working areas, midden deposits, pit and terrace complexes, gardens, open settlements, and pa (Barber 1992; 1994; Brailsford 1981: Chapter 9; McFadgen and Challis 1979; Orchiston 1974; Walls 1991). Eastern Golden Bay is also the region where the earliest recorded contact between Maori and (Dutch) Europeans took place in 1642 (Barber 1992).

Before the 1990s little archaeological research had been undertaken in this region. This was partly because of the relative isolation and distance of Golden Bay from university archaeology departments and major museums. After 1990 an unprecedented expansion of land use activities (most notably subdivision and associated service developments) began to affect archaeological sites in Golden Bay. In 1996, Tasman District Council constructed the Takaka-Pohara Sewerage Scheme ("Pohara Sewerage Scheme") to service several small eastern Golden Bay communities. Associated works exposed significant buried archaeological site complexes, including stratified midden deposits, modified soil horizons, and structural features. Important archaeological landscapes have now been identified at Tata Beach, Ligar Bay and Pohara Beach (Figures 1 and 2).

These developments present a range of challenges to hapu and iwi responsible for Maori heritage management in Golden Bay. Tasman District Council and the NZ Historic Places Trust (the "Trust") have also faced planning and consenting difficulties respectively as statutory authorities responsible for cultural heritage protection. Even so, the agencies, hapu/iwi, and land users have generally worked cooperatively to help identify and avoid sites wherever

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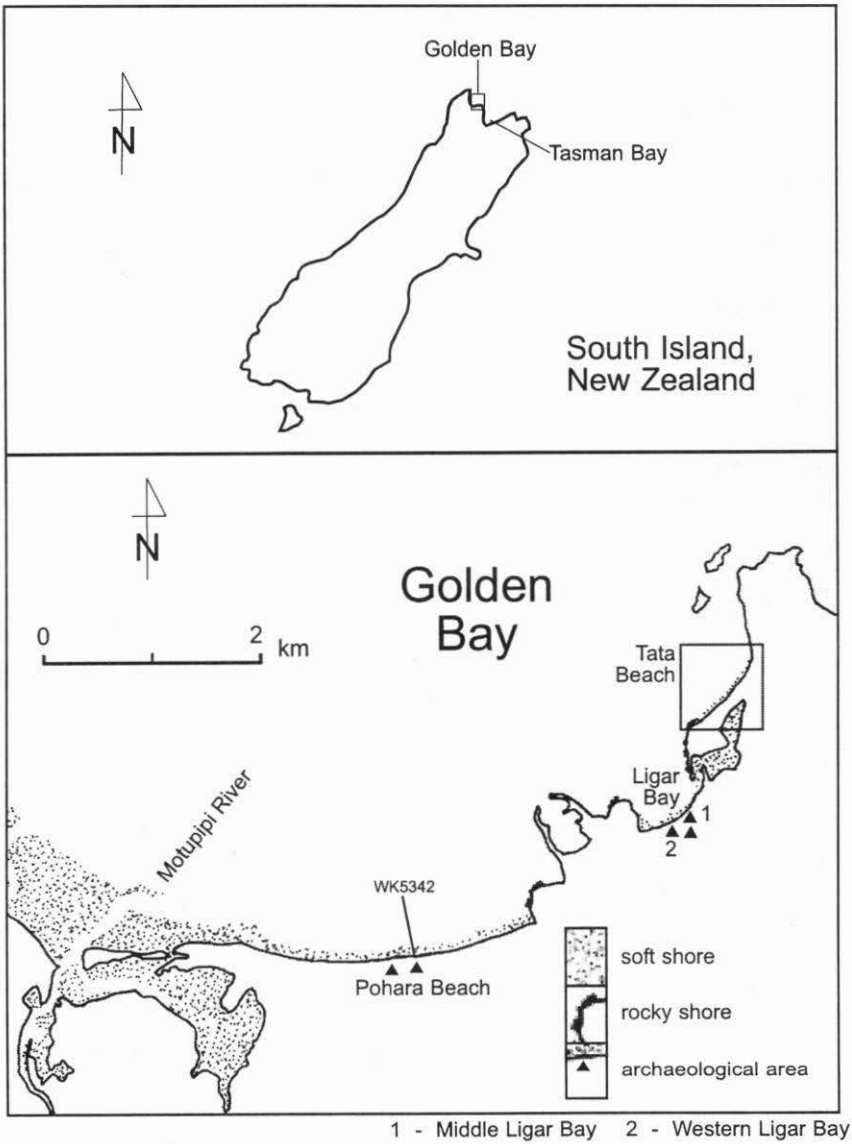


*Figure 1. Map of locations in eastern Golden Bay discussed in text. For details of the archaeological area of Tata Beach (which is not represented above), see Figure 2. Topographic information is derived from NZMS 260 Sheet N25 (Tarakohe), 1: 50,000, Edition 1, 1984, Crown copyright reserved.*

possible, and retrieve information through archaeological investigation where appropriate and necessary.

Early in 1996 I was engaged as an independent consultant archaeologist to carry out the work of recording and investigation for archaeological sites affected by the Pohara Sewerage Scheme under Trust general authority no. 1995/69 (pursuant to section 14, Historic Places Act 1993). Further archaeological work was undertaken on behalf of the Trust in relation to site protection and mitigation problems at Tata Beach and Ligar Bay in 1997 (Barber 1997; 1998a; 1998b).

Analysis of the massive amount of archaeological material retrieved is ongoing. This report presents a preliminary overview only of the results to date. A paper exploring the challenges of heritage management in eastern Golden Bay and the response of iwi has been presented and summarised elsewhere (Barber and Delaney 1998).

## Tata Beach

The landscape of Tata Beach includes a peninsula bordered on its northern side by a soft shore open beach enclosed by rocky shore, and an estuary on its southern side (Figures 1 and 2). This environment is part of the granite coast extending from western Tasman Bay.

Three primary stratigraphic units are recognised over Tata Beach (Figure 3). A discontinuous, charcoal stained basal unit with a diffuse border (L3) represents initial land clearance. Scattered pits of a size appropriate for the storage of kumara, *Ipomoea batatas*, are recorded within L3 along the Esplanade. These basal pits extend between 2 and 3.5 metres horizontally. Evidence of vertical postholes suggests these structures once carried roofs.

L2 is an extensive unit incorporating a range of structural features, especially near the beach. A pattern of ovens or oven scoops is identified less than a metre from single postholes along the beach front. Since no other structural evidence is found in association with these sites, the postholes may represent marker posts for the relocation of ovens excavated into the relatively featureless sandy terrain. Other isolated postholes or posthole series within L2 may be the remnants of fish-drying structures, as suggested by an early 1840s drawing of Maori drying fish just above the beach in this general area (see reproduction in McAloon 1997: 5). Some very large single postholes

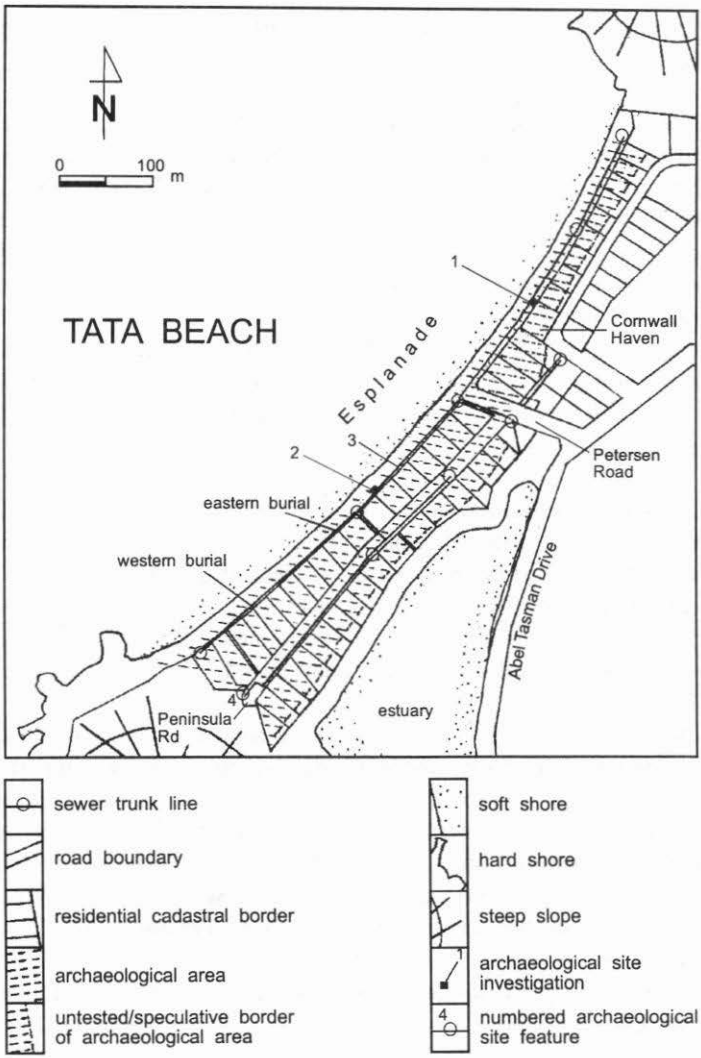


*Figure 2. Tata Beach, showing the extent of continuous archaeological soils, and individual sites or features as numbered in text. Topographical and selected cadastral information is derived from proposed Tasman District Council Planning Maps (Resource Management Plan 25 May 1996; used with permission of Tasman District Council). Cadastral borders are shown only for properties in the proximity of archaeological sites. See Figure 1 for location in eastern Golden Bay.*

from L2 may represent pou whenua or marker posts of ritual or political significance.

Domestic structures are characteristic of L2. A well preserved hearth with carefully placed alternating limestone and granite rocks was identified in the investigation of a living complex (Figure 4; located at ESD/1 (No. 1, Figure 2) and shown in stratigraphic context, Figure 3a). Significant clusters of postholes are also recorded within a very dark grey to black sub-unit of L2 (L2ii), apparently representing houses, fences, or other substantial structures. A remarkable linear concentration of these occurs over a distance of 100 m (between point 3 and the eastern burial shown at Figure 2). Within each cluster the postholes are usually less than a metre apart. They extend down to 60 cm depth below L2ii in some cases, and are between 20 and 40 cm wide (i.e. horizontally).

Small pits up to 60 cm wide extending less than a metre below L2ii are frequently recorded in association with these posthole groups. The pits are generally squarish. They may represent cleaned out fire scoops or general domestic storage facilities. The fill of black charcoal stained sand means that all of these L2ii features are especially prominent against the lighter cultural L3 or sterile sand matrix into which they intrude (Figures 5 and 6).

L1 is the upper unit of the archaeological sequence. It is identified most clearly along the Esplanade, where it is discontinuous (at least in part because of topsoil removal in recent land development). In places L1 appears to incorporate evidence of mineral additions associated with gardening. Scattered archaeological features only are recorded within L1 along the Esplanade otherwise, including ovens and burials. Large storage pits between 4-5 m wide are also recorded at the western end of Peninsula Rd (in the area identified as No. 6, Figure 2). Their stratigraphic association is uncertain, but in the absence of significant topsoil development, they may be associated with L2 if not L1.

Radiocarbon dates are available from about the L2/L3 interface of ESD/1 (No. 1, Figure 2) and from one of the large pits at Peninsula Rd (No. 6, Figure 2). As calibrated, these marine and terrestrial dates respectively bracket the 16th century AD (Wk4911, Wk4912; see Barber 1998a: appendix for calibration and other details). Consequently, this century may be viewed as a reasonable upper limit for the time of earliest settlement at Tata Beach. An earlier date for the onset of L3 is possible. Radiocarbon dating research

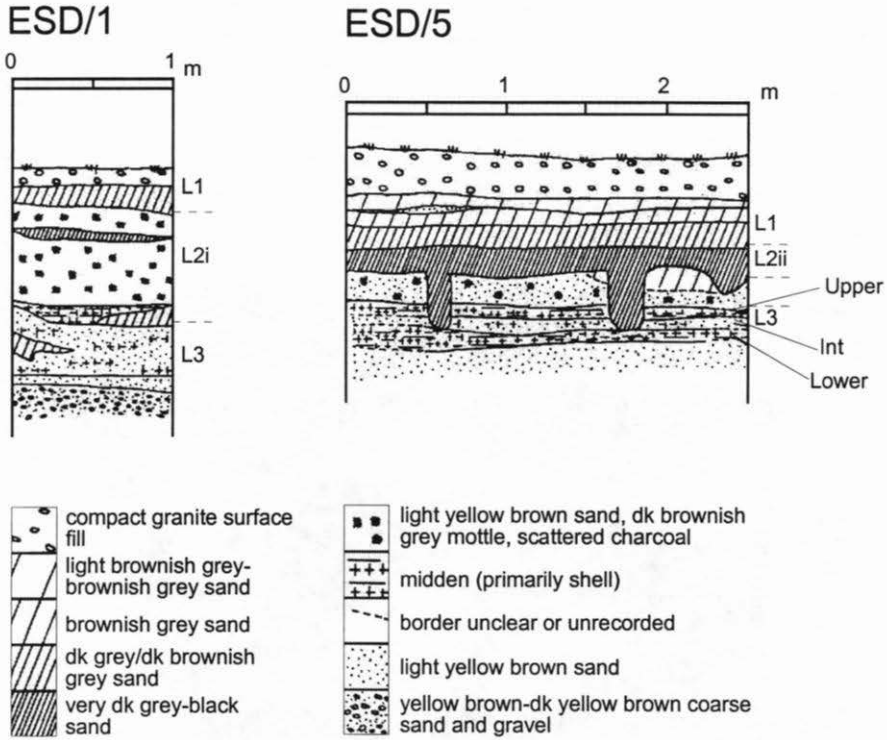


*Figure 3. Archaeological sections from investigations along the Pohara sewer line of the Esplanade, Tata Beach.*

*Figure 3a (left). Narrow section from ESD/1 (No. 1, Figure 2) to show very dark grey-black lens matrix within L2 associated with the hearth recorded at this site. Note also identification of Layers 1-3 as discussed in text.*

*Figure 3b (right). Section from ESD/5 (No. 2, Figure 2). Note identification of Layers 1-3, and upper, intermediate, and lower midden deposits within L3, as discussed in text. Note also two postholes from L2ii.*

on the midden chronology of L3 at ESD/5 (No. 2, Figure 2) by Fiona Petchey of the University of Waikato should help clarify the date of earliest Tata Beach settlement.

At the upper end of the archaeological sequence L1 may extend into the 17th century or later. Two individuals identified from burials excavated into L1 (see Figure 2) both present tooth and mandible wear and damage characteristic of the latter part of the Maori sequence (Barber 1998a with reference to Houghton 1980). Clay pipes identified in archaeological contexts at western Tata Beach may date to the early 19th century (J. Walls, pers. comm.). As indicated above, there is documentary evidence of an 1840s Maori fishing community living in the area of Tata Beach as well.

*Figure 4. Hearth stones identified from the archaeological investigation of the Pohara sewer line adjacent to Cornwall Haven, Tata Beach (ESD/1; see No. 1, Figure 2 for location, and Figure 3a for stratigraphic context). The stones are arranged so as to alternate between limestone and granite rock types.*

Metasomatised argillite ("meta-argillite") stone flakes from the Nelson mineral belt are found in most large midden sites, and very occasionally in isolation or concentration within archaeological soils and pits. These are

discard flakes from adze maintenance or manufacture. In some cases flakes have been used or retouched for scraping and cutting purposes. Adze fragments and adzes, primarily of meta-argillite rock, have been recovered also. Grave goods placed with the two burials along the Esplanade include retouched meta-argillite flakes and adzes.

From Tata Beach midden sites, the shellfish species are predominantly soft shore pipi *Paphies australis* and hard shore blue mussel *Mytilus edulis*. There is a minor but notable representation of tuangi (cockle) *Austrovenus stutchburyi* and green mussel *Perna canaliculus* on occasion, as well as gastropods such as mud snail *Amphibola crenata*, *Cominella* spp. (whelks), cook's turban *Cookia sulcata*, ostrich foot *Struthiolaria papulosa* and cat's eye/pupu *Turbo smaragdus*. Finfish remains are generally dominated by red cod *Pseudophycis bachus*, followed by barracouta *Thyrsites atun*. Of minor finfish species represented, occasional robust bones of ling *Genypterus blacodes* are notable. There is a puzzling dearth of the locally renowned and seasonally plentiful snapper *Pagrus auratus* from almost all Tata Beach midden deposits.

The most extensive stratified midden excavated and investigated at Tata Beach is recorded within L3 (ESD/5; No. 2 at Figure 2, and see stratigraphy at Figure 3b). Two discrete and continuous upper and lower deposits are separated by an intermediate zone of yellow-brown sand. The last incorporates discontinuous midden lenses and scattered midden remains otherwise. Each of these L3 units includes shellfish, finfish, and scattered dog, sea mammal, and very occasional bird and rat bones. Some of the sea mammal bones present signs of sawing and manufacture. Waste fragments of dog long bones are consistent with artefact manufacture on site.

From the intermediate matrix, a dense concentration of mammal faeces is identified in a horizontal space no greater than about 2 x 1.5 m. These remains are almost certainly from dogs. The concentration of faeces in one small area only of an extensive midden deposit indicates that the animals were confined or tethered, as suggested for other New Zealand sites (Davidson 1984: 130). Animal scavenging may help explain the evidence of discontinuous lenses and scattered midden components in the intermediate zone here as well. Dog skeletal remains are also distributed widely over archaeological soils of coastal and inland Tata Beach, including solitary finds and in one case at least, an entire animal.

*Figure 5. Series of postholes from L2ii in section, Esplanade west of Petersen Rd, Tata Beach (located at No. 3, Figure 2).*

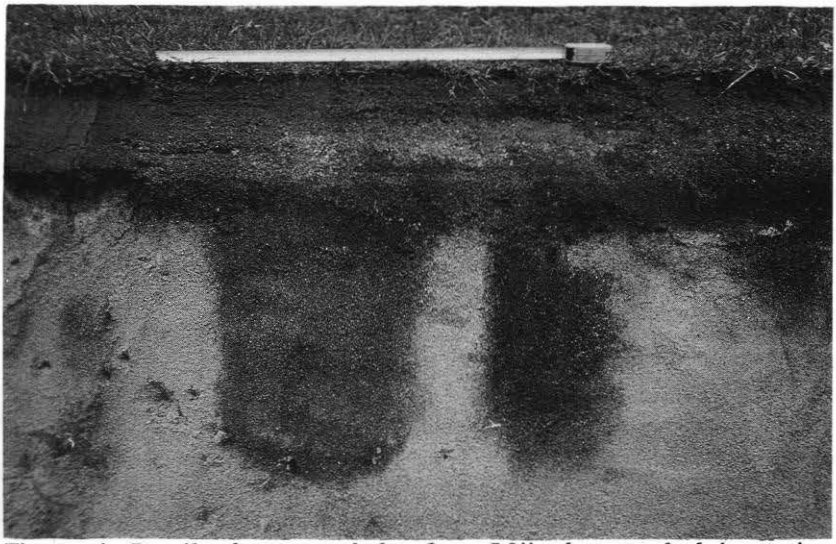

*Figure 6. Detail of two postholes from L2ii photographed in section, Esplanade west of Petersen Rd, Tata Beach (see Figure 2 no. 4 for location). Note especially the regular sides and rounded base of the posthole on the left (55cm x 40cm).*

The stratigraphy of ESD/5 presents unique evidence (for Tata Beach midden deposits analysed to date) of changing fish proportions over time. From the lower and intermediate units, red cod is dominant over barracouta. In the upper unit however the proportions are reversed as barracouta is dominant (Table 1). This is a trend seen also in the stratigraphic sequence of a large midden of similar chronology in western Tasman Bay (at Sawpit Point, Awaroa Inlet; see Barber 1994: 221).

Charcoal fragments collected from upper and lower midden units of L3 at ESD/5 have been identified by R. Wallace, University of Auckland, for radiocarbon dating purposes (to F. Petchey, pers. comm.). From the lower midden, up to twelve plant species are identified. By taxonomic order these include bracken fern *Pteridium esculentum*, matai *Prumnopitys taxifolia*, rimu *Dacrydium cupressinum*, pukatea *Laurelia novae-zelandiae,* kawakawa *Macropiper excelsa*, mahoe *Melicytus ramiflorus*, rata *Metrosideros* sp., beech *Nothofagus* sp., orihou *Pseudopanax colensoi*, *Olearia* sp., ngaio *Myoporum laetum*, and ti/cabbage tree *Cordyline australis*. From the upper midden deposit, just eight plant species are identified, including bracken, mahoe, pukatea, beech, rata, ti, ngaio, and (as the sole addition to the plant taxa from the lower midden), kahikatea *Dacrycarpus dacrydioides*. Further charcoal identifications have become available just as this paper goes to press from a Tata Beach oven recorded within L1 (R. Wallace, pers. comm.). This feature was exposed by development, and investigated at the intersection of Petersen Rd and Esplanade in December 1997 (under Trust authority no. 1997/126). A minimum of seven New Zealand shrub species are identified from the charcoal sample. No canopy trees are represented.

These results point to a loss of plant diversity over the archaeological sequence of Tata Beach, culminating in localised deforestation. It is interesting also that both bracken fern with its edible rhizomes and the edible ti is identified in upper and lower midden units of L3. This suggests wild plant foods may have been consumed from the time of first settlement.

From this evidence it appears that the extensive basal charcoal stained unit of L3 represents initial or early forest clearance, perhaps for gardening and to encourage wild plant foods. Associated midden remains place this land use activity within the context of a primary maritime economy with some focus on canine husbandry. The charcoal blackened deposits, ovens, and posthole and small pit series of L2ii may represent a concentration of activities associated with more intensive coastal processing around the 16th century

AD. The evidence of L1 is consistent with extensive land use (including gardening) over the area of the larger deforested peninsula from the 17th century or later.

### Ligar Bay

Ligar Bay is a soft shore environment bordered by rocky coast, especially to the west. (Figure 1). It is the western-most bay of the granite coast.

There is evidence of early occupation deposits around the middle part of the bay ('middle Ligar Bay'; see Figure 1). A basal midden deposit is recorded and has been investigated in two places. An upper, charcoal enriched archaeological soil extends from the middle to the western margins of Ligar Bay (Barber 1998a; Gumbley n.d.). This apparently involved kumara horticulture and/or fern root harvest, since the land concerned presents a rich, free draining alluvial deposit of some fertility on a gentle north-facing rise (an appropriate medium and aspect for the growth of both plants). At the western end of Ligar Bay, this (same?) extensive soil horizon extends up slope over the crest of a large and stable dune, as well as over sandy flats. Consistently a number of storage pits were recorded on the crest of this dune in the 1960s. These appear to have been destroyed in subsequent residential development. The separation of shell midden lenses by relatively sterile sand deposits in places below the western Ligar Bay dune suggests that the onset of extensive land use encouraged slope instability or dune mobility.

The shellfish valves in Ligar Bay midden sites are primarily soft shore *Paphies* spp. Tuatua is often notable (either or both *Paphies donacina* or *subtriangulata*), and occasionally dominant. Tuangi is generally present as a minor soft shore species. Mud snail and other gastropods identified at Tata Beach are also represented consistently in almost all Ligar Bay midden sites as minor species. The presence of both mussel species *Mytilus edulis* and *Perna canaliculus* in many midden deposits (in some cases subdominant to *Paphies* spp.) is consistent with the harvest of local rocky shore environment(s) as well. Mammal remains include dog, and very occasional cetacean and rat bones. Finfish remains include red cod (especially) and barracouta, and from middle Ligar Bay at least, occasional robust ling bones among other minor species. Snapper is prominent by both numbers of elements and individuals among finfish identified from basal midden deposits only at middle Ligar Bay during the 1996 sewerage scheme works, and again in a 1997 investigation (under Trust authority no. 1996/128).

Radiocarbon samples excavated from basal and upper archaeological deposits of middle Ligar Bay are being processed currently. Paired marine and charcoal radiocarbon dates processed in 1994 from middle to western Ligar Bay sites range over the 15th and 16th centuries AD, with one early group at least clustering around the 15th century (Gumbley n.d.; Schmidt 1996: chapter 6).

The report of storage pits from the (pre-development) dune crest of western Ligar Bay, and along the higher inland slopes (Barber 1992; Gumbley n.d.), may be associated with the onset of extensive lowland gardening. From Ligar Bay generally, artefacts are restricted to isolated finds. These are usually quartz or meta-argillite fragments and occasional meta-argillite adzes. Intermittent structural evidence only was encountered from Ligar Bay excavation sections as well. However, concentrated settlement evidence with associated pit and posthole complexes may lie buried and unrecorded closer to the beach (as at Tata Beach). Settlement remains may be found also in other areas yet to be investigated systematically, such as the gentle slope behind the beach front where a stone minnow lure has been found (J. Walls, pers. comm.).

**Pohara Beach**

Pohara Beach (Figure 1) presents a long, sweeping, open beach bordered by a hard shore limestone environment to the east, and further open beach and estuary environments to the west. As demonstrated by its characteristically fine sands, Pohara Beach lies beyond the coarse lithic influence of the granite coast.

There are no complex stratified archaeological sections identified at Pohara Beach (unlike Ligar Bay and Tata Beach). The archaeology of Pohara Beach is characterised instead by isolated shell midden lenses, often associated with discontinuous charcoal enriched soil layers extending over hundreds of square metres at least. These archaeological soils are sometimes 1 to 2 metres deep. Overlying archaeological deposits are generally separated by non-cultural dune sands. This archaeological evidence is concentrated around low dunes behind the beach front.

The midden sites of Pohara Beach are dominated by soft shore shellfish species. These are most commonly *Paphies* spp., and more variably, tuangi and mud snail. Other species reported less frequently or consistently include bivalves of *Dosinia* spp., as well as whelks (*Cominella* spp., as at Tata Beach

and Ligar Bay) and ostrich foot. The Pohara Beach midden sites show greater inter-site variability than at Ligar Bay or Tata Beach. While pipi is dominant in many Pohara Beach midden deposits, for example, occasionally mud snail is reported in greater number. Hard shore shellfish are hardly represented in any midden investigated, indicating that the limestone shore to the east was not a preferred place of harvest.

Of vertebrate animals, red cod is yet again the dominant finfish species in general. There is some representation of barracouta. Dog or bird bone is not identified to the present time of analysis. Cetacean bones are found in some Pohara Beach midden deposits. These include smallish vertebrae with detached epiphyses, apparently representing the butchery of young animals.

The lowest midden deposits lie on a weathered light yellow brown sand. By contrast, the sand overburden separating basal and upper midden deposits is light brownish grey. With no mottle or obvious organic lenses, this clean sand is the apparent result of a "drift regime" (Taylor and Pohlen 1970: 156) of inorganic, mechanical processes. The stratigraphic isolation of charcoal-stained layers within deep, sterile dune sand deposits (cf. Tata Beach and Ligar Bay) would argue that land use here was not sustained over many generations. This is consistent with the dearth of artefacts and structural evidence beyond oven sites.

The first of several radiocarbon determinations expected from Pohara Beach has been processed from a sample of *Dosinia* valves. This dates a midden deposit recorded at a depth of 1.8 m below sterile sand overburden near the crest of a dune (see Figure 1). The marine age (Lab No. Wk 5324; Conventional Radiocarbon Age 870 $\pm$ 40 yrs BP) as calibrated by an appropriate southern hemisphere standard at 0.05 probability brackets the 15th century AD (cal AD 1402-1501; for other details see Barber 1998a: appendix)

## Discussion and Further Research

The archaeological site information discussed here can address research questions on settlement patterns, economic change, and social organisation. At a collective level, the diversity of site distribution and other landform and environmental information from the region can be submitted to geographic (i.e. GIS) analysis and study. A problem of particular note concerns the general absence of earthwork defences in eastern Golden Bay. Pa sites are recorded otherwise in some number from western Golden Bay, and especially

the granite coast of neighbouring Tasman Bay (cf. Barber 1996: 876 and figure 2; Brailsford 1981: chapter 9). Further work on intra- and inter-site associations, and temporal and spatial relationships involving activity areas and structural evidence is also planned. In particular, the evidence of intensive coastal processing, animal husbandry, deforestation, and a concentration of domestic structures along the narrow Tata Beach peninsula could suggest the development of an important regional centre there by the 16th century AD.

The further identification and comparison of faunal remains from eastern Golden Bay sites will clarify patterns of terrestrial and coastal resource use in this region. These data may address a range of cultural and environmental questions. In particular, the paucity of snapper in all but the earliest archaeological sites of eastern Golden Bay follows a pattern identified previously in western Tasman Bay (cf. Barber 1994: chapters 5 and 6; 1996: 872). This is an intriguing research problem, where factors of climate change as well as seasonal occupation must be considered.

The evidence of a 15th century chronology (at the latest) for the initial settlement of eastern Golden Bay raises another important question. Diagnostic moa bone is reported from 14th century to 15th century northern South Island midden sites elsewhere (cf. Barber 1994: Chapter 4 and 1996). However, industrial or subsistence moa bone is not identified to date from any early eastern Golden Bay archaeological deposit reported here. Manufacturing bone where identifiable includes sea mammal, small bird, and dog (especially). Furthermore, small bird bones of coastal and/or wetland species only are identified thus far from the lowest deposit of a deep stratified archaeological section at Tata Beach (ESD/1; No. 1 at Figure 2, and see Barber 1998a). In contrast, the bird assemblage from a moa-hunting site of neighbouring western Tasman Bay presents a range of coastal and forest taxa (at Anapai; see Barber in press). These anomalies underscore the need for more research on the regional timing and consequences of the early Polynesian impact on New Zealand's avifauna. In this regard bird bones from archaeological deposits of the once heavily forested Ligar Bay catchment are a priority for identification to species.

Anticipated future work should also include soil and pollen studies and the processing of further radiocarbon ages and charcoal samples for species identification (especially from Ligar Bay and Pohara Beach). Associated research on the traditional history of this area is planned under the direction

of tangata whenua. This work may be integrated into a heritage survey project involving the larger Golden Bay community (NZ Historic Places Trust 1998).

**Acknowledgements**

Manawhenua ki Mohua representing Golden Bay iwi Ngati Rarua, Te Ati Awa and Ngati Tama consented to, and participated actively in the work of site recording and investigation reported here. Iwi representative Trina Mitchell (formerly Delaney) deserves special mention in this regard, especially for ongoing field assistance. Local archaeologist Jack Walls undertook many hours of field work as well. Fiona Petchey and Fiona Kirk provided specialist field and analytical assistance. Plant species were identified from charcoal samples by Rod Wallace of the Department of Anthropology, University of Auckland.

For Tasman District Council, district engineer Jim Wareing and consultant engineer Bill Page gave appropriate direction on the Pohara sewerage project in 1996. At the Takaka office of Council, Noel Riley, Laurie Davidson and Dean Hunt provided administrative support. In the first months of 1996 the construction crews of Sollys Contractors and Fulton Hogan Ltd respectively responded to archaeological requirements with great patience and interest, and provided excellent company. With respect to site recording and investigation in 1997, I acknowledge the cooperation of Alan Swafford in Ligar Bay, and Kevin Forsman of Envirotech Design Group, Takaka. As my employer since June 1996, the NZ Historic Places Trust/Pouhere Taonga has offered ongoing support for the proper care, management and investigation of the important archaeological landscape of eastern Golden Bay.

**References**

Barber, I. 1992. First contact in Golden Bay. *New Zealand Historic Places* 39 (December): 49-52.

Barber, I. 1994. Culture change in northern Te Wai Pounamu. Unpublished PhD thesis, University of Otago.

Barber, I. 1996. Loss, change, and monumental landscaping: towards a new interpretation of the "Classic" Maaori emergence. *Current Anthropology* 37: 868-880.

Barber, I. 1997. Archaeological assessment and preliminary investigation report: Tata Beach Development Project Stage 1. Unpublished report submitted to Tasman District Council, Manawhenua ki Mohua (Takaka), and the NZ Historic Places Trust (Wellington).

Barber, I. 1998a. Archaeological report on the Pohara Sewerage Scheme. A report to the NZ Historic Places Trust (Pouhere Taonga) pursuant to the conditions of authority Nos. 1995/69 and 1996/25.

Barber, I. 1998b. An archaeological report on burial sites encountered at Tata Beach, April 1996. Unpublished report submitted to the NZ Police (Takaka), Manawhenua ki Mohua (Takaka), and the NZ Historic Places Trust (Wellington).

Barber, I. In press. Identifying hunting restraint in archaeology: the evidence from bird remains in northern South Island Maori midden sites. *International Journal of Osteoarchaeology*.

Barber, I, and Delaney, T. 1998. "Archaeological landscapes and cultural heritage management in eastern Golden Bay". [In] report on papers presented [at the Annual General meeting of the NZ Archaeological Association, April 1998]. *Archaeology in New Zealand* 41: 106-107.

Brailsford, B. 1981. *The Tattooed Land: The Southern Frontiers of the Pa Maori*. Reed: Wellington

Davidson, J. 1984. *The Prehistory of New Zealand*. Longman Paul: Auckland.

Gumbley, W. n.d. Report on the archaeological investigation of N25/95, Ligar Bay, eastern Golden Bay. Unpublished report, NZ Historic Places Trust, Wellington.

Houghton, P. 1980. *The First New Zealanders*. Hodder & Stoughton: Auckland.

McAloon, J. 1997. *Nelson: A Regional History*. Cape Catley Ltd: Whatamango Bay, Queen Charlotte Sound.

McFadgen, B. G. and Challis, A. J. 1979. Late Holocene geology and archaeology of Parapara Spit, Golden Bay, New Zealand. *New Zealand Journal of Geology and Geophysics* 22(1): 141-145.

NZ Historic Places Trust/Pouhere Taonga. 1998. Iwi form partnerships. *Heritage Advocate: Pouhere Taonga Panui* 28 (July): 3.

Orchiston, D. W. 1974. Studies in South Island New Zealand prehistory and protohistory. Unpublished PhD thesis, University of Sydney.

Schmidt, M. D. 1996. Radiocarbon dating New Zealand prehistory using marine shell. Unpublished DPhil thesis, University of Waikato.

Taylor, N. H. and I. J. Pohlen. 1970. Soil Survey Method: A New Zealand Handbook for the Field Study of Soils. *NZ Soil Bureau Bulletin 25*.

Walls, J. Y. 1991. Quartzite and whales in Golden Bay. *Archaeology in New Zealand* 34: 158-160.

**TABLE 1**

*Representative Minimum Number of Individual figures for barracouta* Thyrsites atun *and red cod* Pseudophycis bachus *from lower, intermediate, and upper L3 midden units respectively of ESD/5, Tata Beach (see Figure 3b for stratigraphic details). The figures are determined from diagnostic cranial bones combined from random sample bags to show a proportional increase in numbers of barracouta to red cod between stratigraphic units. They are not total site assemblage counts.*

| Midden unit | Red cod | Barracouta |
|---|---|---|
| Upper | 12 | 28 |
| Intermediate | 52 | 6 |
| Lower | 57 | 16 |