

FIGURE 10. LEVELLED PROFILES ACROSS THE HOLOCENE BARRIER SHOWING RELICT FOREDUNES AND SWALES. CORRELATION BETWEEN PROFILES SHOWN BY DASHED LINES. LOCATION OF PROFILES SHOWN ON FIGS 8 AND 17. DISTANCES IN METRES FOR ALL PROFILES EXCEPT M-N ARE MEASURED HARBOURWARDS FROM THE PRESENT OCEAN BEACH. M-N SHOWS THE INNERMOST 500m OF THE BARRIER.

TABLE 3. DESCRIPTION OF SOIL PROFILE IN SWALE 150m HARBOURWARDS OF THE TAUPO FOREDUNE ALONG TRANSECT G-H.

DEPTH (cm)	DESCRIPTION
0-37 [Forestry-disturbed soil]	Brownish-black (10YR2/2) sandy loam with faint, medium and coarse dark brown (10YR3/3) mottles, few increasing downwards to abundant at the boundary with the underlying Kaharoa Tephra. Weakly developed fine to very fine nut structure. Firm. Few roots, few fine charcoal fragments, few fine lapilli. Sharp to distinct irregular boundary.
37-47 [Kaharoa Tephra]	Kaharoa Tephra. Fine component (ca 2cm thick layer) generally on top with coarse at the bottom, but also mixed in places. Dull yellow (2.5Y6/3). Firm. Distinct wavy boundary.
47-52 [Buried topsoil]	Dull yellowish-brown (10YR5/3) sand. Weakly developed fine to very fine nut structure. Friable. Few roots, few coarse rounded pumice fragments up to 10cm long, many fine and very fine lapilli, few fine charcoal fragments. Indistinct wavy boundary.
52-69 [Leached horizon]	Dull yellow-orange (10YR7/3) sand with few faint medium dull yellow-orange (10YR6/3) mottles. Single grain. Very friable. Few roots. Distinct smooth boundary.
69-81 [B horizon]	Dull yellowish-brown (10YR5/3) loamy sand with many fine and medium faint brown (10YR4/4) mottles. Weakly developed very fine to coarse nut and blocky structure. Firm. Few roots. Indistinct smooth boundary.
81-100 [Parent material]	Dull yellowish-brown (10YR5/4) sand with many medium and coarse distinct brown (7.5YR4/4) mottles. Single grain. Very friable. Few Roots. Distinct irregular boundary.
100-110+ [Parent material]	Dark reddish-brown (5YR3/3) sand with profuse faint medium brown (7.5YR4/4) mottles. Weakly developed very fine to fine nut and fine blocky structure with single grain. Firm.



FIGURE 11. OBLIQUE PHOTOGRAPH OF THE NORTHWESTERN END OF THE RELICT FOREDUNE PLAIN SHOWING RELICT FOREDUNES AND SWALES. VIEW TO THE NORTHWEST.

Stent tephra is tentatively identified in relict foredune deposits in a section at Hunter's Creek (Q, Fig. 8). Sea-rafted Waimihia Pumice was found as abundant rounded pumice clasts up to c. 5 cm diameter in beach sand below the Swale 50 m seaward of Long Ridge (W, Fig. 8).

Taupo Lapilli is in stratigraphic position immediately below Kaharoa Tephra in many swales. It is present as a lag deposit on many of the relict foredune surfaces where it has been concentrated by wind erosion following forestry operations. The Taupo foredune is identified near Profile G-H (Figs. 8 and 10) by abundant Taupo Lapilli mixed with the sand on its seaward slope. It is a short distance inland of the strip of parabolic dunes. Near Profile E-F (Figs. 8 and 10) there is a marked increase in the proportion of volcanic glass in the Taupo foredune compared with relict foredunes on either side (Fig. 15). No Taupo Lapilli has been found seawards of this ridge.

Kaharoa Tephra once covered most of the relict foredunes and is present today in many swales as an undisturbed airfall deposit right up to the inner margin of the strip of parabolic dunes along the present coast. It has been located about 120 m from the present shoreline at two places (K, Fig. 8) where it is buried by the parabolic dunes. Swales containing undisturbed Kaharoa Tephra are truncated by the Purakau Shoreline. Kaharoa Tephra is absent from the ocean side of the shoreline. There are abundant and extensive deposits of sea-rafted Loisel's Pumice on the immediate ocean side of the Purakau Shoreline.

The radiocarbon age of shells from Shelly beach sand in a swale between two recurved ridges to the north of the old Blue Gum Bay harbour entrance is 4914 ± 65 yr BP (NZ8235) (Fig. 16). Further along the same Swale to the north the age of shell fragments from Shelly beach sand is 8703 ± 72 yr BP (NZA3880). Beneath the backslope of Long Ridge, where it crosses the Blue Gum Bay

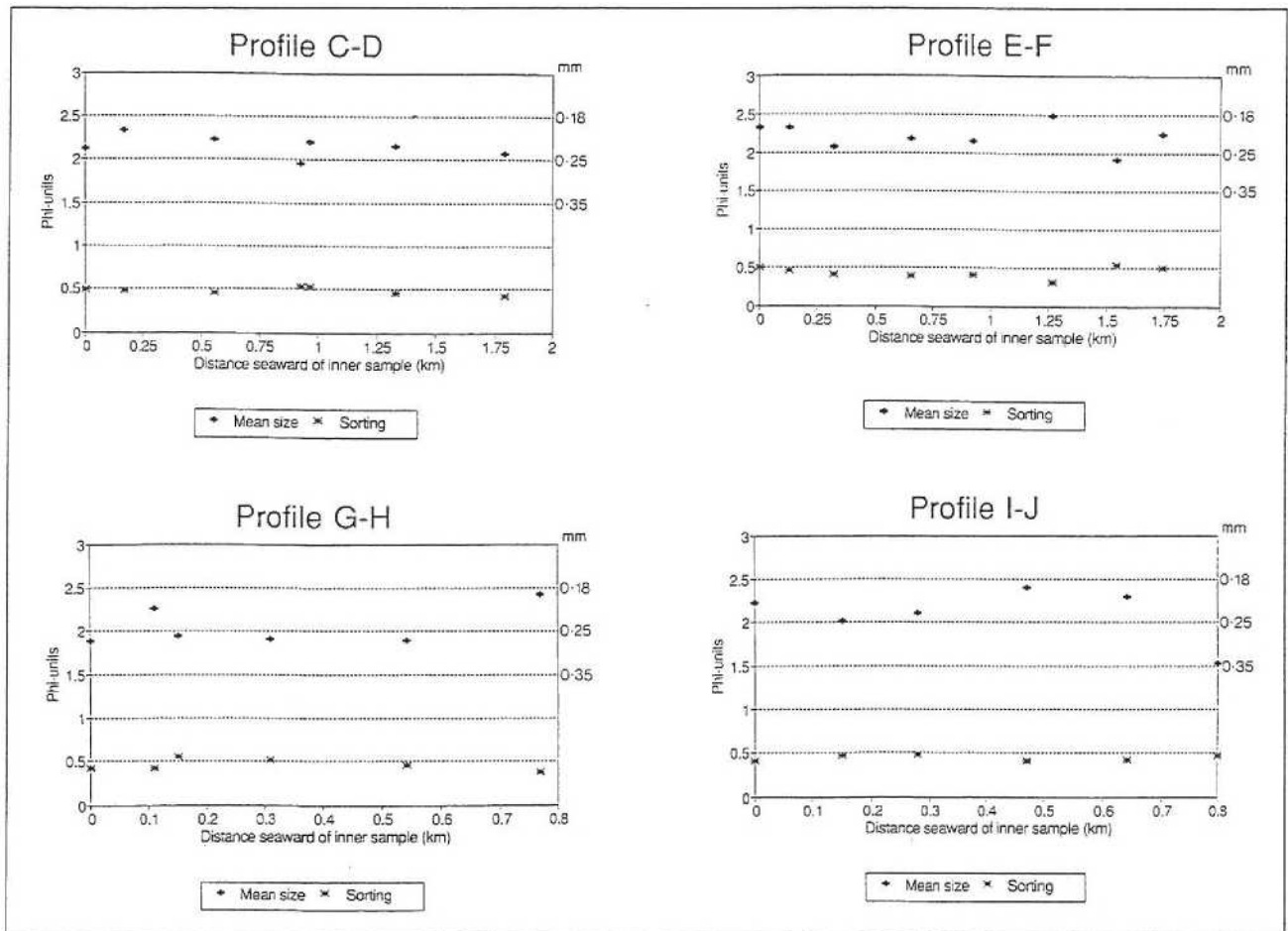
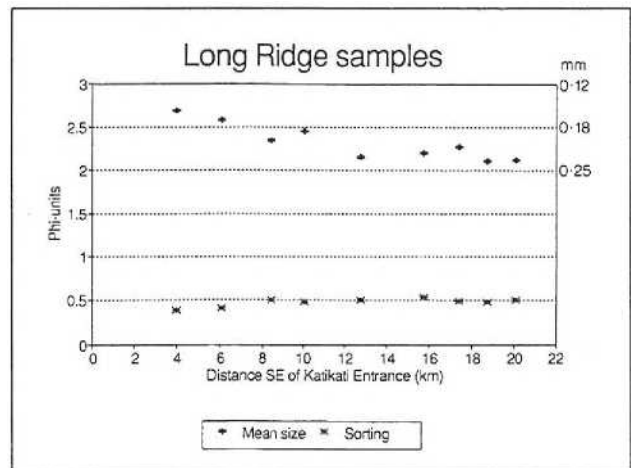


FIGURE 12. MEAN SIZE AND SORTING OF RELICT FOREDUNE SAND SAMPLED ALONG PROFILES C-D, E-F, G-H, I-J (FIG. 8). MEAN SIZE SHOWN IN PHI UNITS AND MILLIMETRES. SORTING SHOWN IN PHI UNITS ONLY. FOR LOCATION OF SAMPLING POINTS SEE APPENDIX 2.

FIGURE 13. MEAN SIZE AND SORTING OF RELICT FOREDUNE SAND SAMPLED ALONG LONG RIDGE (FIG. 7). MEAN SIZE SHOWN IN PHI UNITS AND MILLIMETRES. SORTING SHOWN IN PHI UNITS ONLY. FOR LOCATION OF SAMPLING POINTS SEE APPENDIX 2.



harbour entrance, the age of shells from coarse beach sand is  $5462 \pm 68$  yr BP (NZS236).

Sea-rafted Taupo Pumice is present at the northeastern boundary of the relict Rangiwaea foredunes and estuarine flats (Fig. 16).

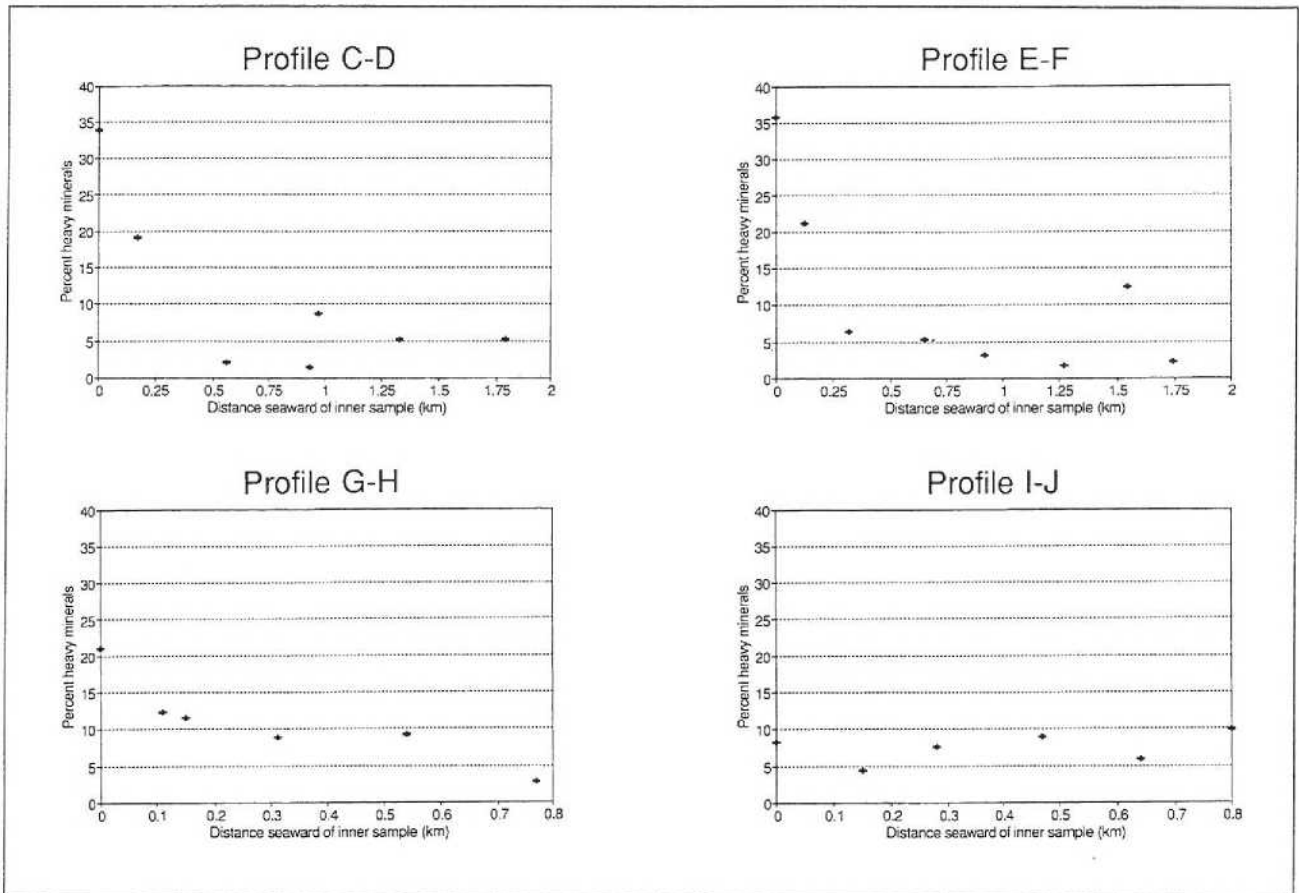


FIGURE 14. HEAVY MINERAL CONTENT OF RELICT FOREDUNE SAND SAMPLED ALONG PROFILES C-D, E-F, G-H, I-J (FIG. 8).

#### 2.2.4 Barrier ends

At the barrier ends the relict foredunes curve to follow previous shorelines of the harbour entrances (Fig. 17). The Northwestern End of the barrier extends northwestward to the Katikati Entrance from where the curves of the relict foredune ridges begin. The Southeastern End is located east and south of the Purakau Shoreline.

##### *Northwestern End*

Two recurved ridges, formed following coastal erosion, truncate older ridges; one ridge begins on the harbour side of Long Ridge, and one begins on the seaward side (S1 and S2, Figs. 17 and 18). The older (S1) is a massive ridge indicating that the harbour shoreline was relatively stable early in the history of the barrier. Younger recurved ridges including S3, the Kaharoa shoreline, diverge and converge and are far lower in height (A-B, Figs. 10 and 17). Dune cover is discontinuous and in some places the underlying beach sand, often containing abundant shells and shell fragments, is exposed at the surface.

Lakes and wetlands fill the swales between some of the ridges. At least seven wetlands exist between the ridges, of which six include small lakes (Fig. 18). The wetlands are typically small and elongated, with their long axes aligned

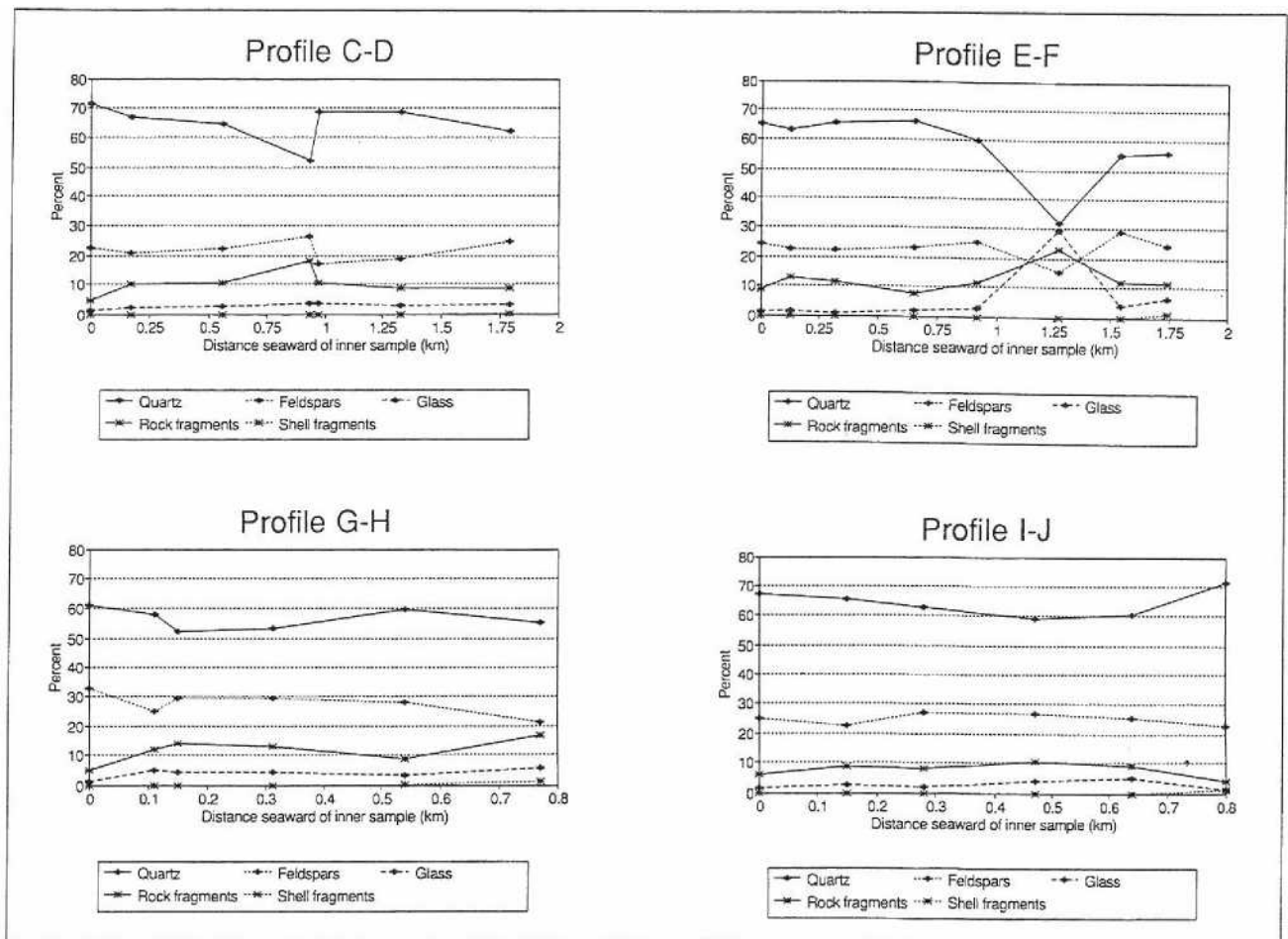


FIGURE 15. MINERALOGY OF THE LIGHT FRACTION OF RELICT FOREDUNE SAND SAMPLED ALONG PROFILES C-D, E-F, G-H, I-J (FIG. 8). E-F SHOWS THE REDUCTION IN QUARTZ AND FELDSPAR AND INCREASE IN VOLCANIC GLASS WITHIN THE RELICT TAUPO FOREDUNE c. 1.25 km SEAWARD OF THE INNERMOST SAMPLE.

roughly parallel to the ocean shoreline and the relict foredune ridges which have impounded there. The largest lake is about 460 m long and up to 60 m wide. Some lake floors are at or below mean sea level and therefore cannot have been formed by deflation. They appear to have been impounded by spit extension. The 1870 shoreline (Fig. 19a) shows lakes in the process of being formed in this way. The lakes have been studied in detail by Munro (1994) who obtained radiocarbon dates for the lake deposits and ridges.

Wetlands in these settings generally begin as lakes, becoming wetlands as the lakes infill with sediments and peat. Kaharoa Tephra is found in peat in the wetland immediately landwards of the S3 shoreline (Figs. 17 and 18), but not in wetlands or lakes further north.

### ***Southeastern End***

The Southeastern End consists of a low plain, on which are hummocky and parabolic transgressive dunes. In general, the Southeastern End is slightly higher than the Northwestern End (A-B, K-L, Figs. 10 and 17) and therefore contains fewer, less extensive wetlands. Coarse sand is present at or near the surface in many places.

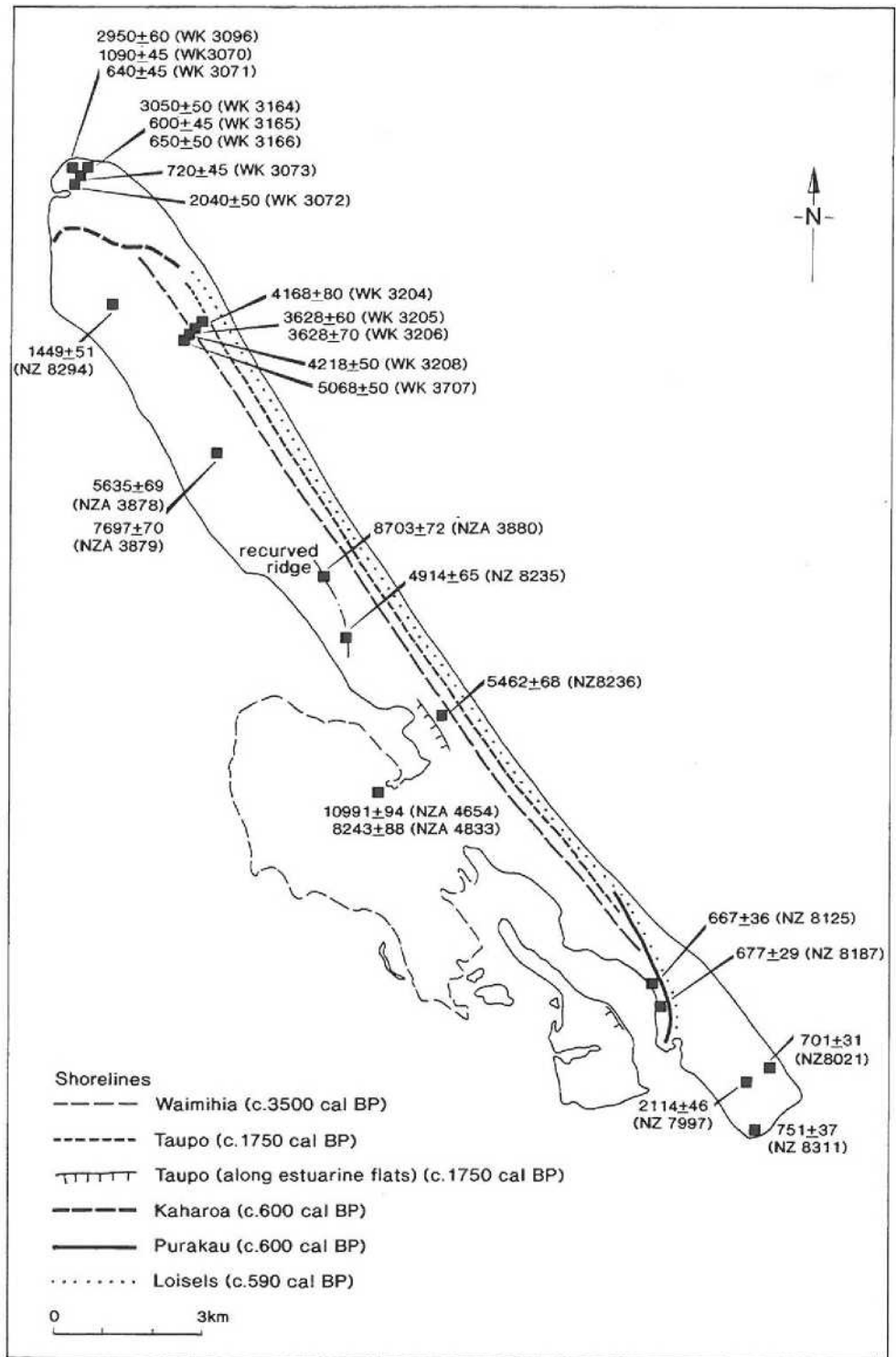


FIGURE 16. MAP OF MATAKANA ISLAND SHOWING LOCATIONS OF RADIOCARBON SAMPLES, RADIOCARBON AGES, AND PALAEO-SHORELINES DATED BY TEPHRA AND SEA-RAFTED PUMICES. LABORATORY NUMBERS IN BRACKETS. LABORATORY NUMBERS PREFIXED "WK" FROM MUNRO (1994). FOR DETAILS OF RADIOCARBON DATES SEE TABLE 1.

No tephra were found at the Southeastern End but there are extensive deposits of sea-rafted Loisels Pumice close to the foot of the Purakau Shoreline at several locations (Fig.17). The pumice covered hundreds of square metres, with waterworn lumps up to 10 cm in diameter.