

two possible eel drain systems near the Waimakariri River, near the confluence with the Kowai River and near the Gorge Bridge, 60 km from the sea (L35/2 and L35/22; site record forms).

## 2.6 Shellfish gathering

Marine shell middens remaining from food gathering have been recorded on over 220 coastal sites. The greatest concentration (140 sites) is located between the Rakahuri (Ashley) River and the Waimakariri River in the inner dune belt east of the Cam River (Figure 9). According to the site records, three common estuarine sand and mudflat species predominate in these sites: in order of frequency, tuaki or common cockle, pipi, and whetiko or mud snail (*Austrovenus stutchburyi*, *Paphies australis*, and *Amphibola crenata*; 97% of reported identifications; scientific names according to Dell 1981 supplemented by Powell 1957). Species from the adjacent ocean beach are present but rare (tuatua, *Paphies subtriangulatum*; large trough shell, *Macra discors*; and triangle shell, *Spisula aequilateralis*).

In north Canterbury from the Waipara River northwards, shell middens contain rocky shore species, particularly toritori or black edged mussel, kutai or green edged mussel, paua, and pupu or cat's eye (*Mytilus edulis aoteanus*, *Perna canaliculus*, *Haliotis iris*, and *Turbo smaragdus*; also kakihi or limpets, *Cellana* sp.; maihi or periwinkles, *Melagraphia aethiops*; and kina or sea egg, *Evechinus chloroticus*). The same rocky shore species dominate in Horomaka (Banks Peninsula) shell middens, but a wider variety is also recorded, including tiokohatu or rock oyster, pupu kaiwhiri or Cook's turban shell, mariri or pink paua, rori or shield shell, kaeo or dark rock shell, and kawari or whelks (*Crassostrea glomerata*, *Cookia sulcata*, *Haliotis australis*, *Scutus breviculus*, *Haustrum haustorium*, *Cominella* sp. and *Buccinulum* sp.). The three common estuarine species, tuaki, pipi, and whetiko, are also prominent, particularly in middens near the Otakaro-Opawaho (Avon-Heathcote) Estuary and near other Horomaka harbours and inlets. In contrast, the unstable shingle beaches of the Canterbury Bight to the south present an unsuitable habitat for marine mollusca, so shell is scarce in middens, except in the Timaru vicinity where rocky shore and sandy bay species are again available.

Very few shell middens have been analysed in any detail. At Panau a small midden deposit was over 90% paua by volume, with at least eleven other rocky shore and estuarine species (fourteenth to early fifteenth century, Wk 2569; Jacomb 1995: 96). At Moa-bone Point Cave, shells found in the lower (moa associated) deposits were all from open sandy beaches (tuatua, trough shell, and dosinia, *Dosinia subrosea*; Yaldwyn 1975: 219). In contrast, shells associated with moa bone nearby at Redcliffs Flat (school section, Hamilton's deposit, and probably of the same period in the sewer trench) were predominantly of estuarine species (tuaki and pipi shells, substantially more robust than those found in later middens and as living populations in the vicinity; Trotter 1975b: 198, 201; Dawson and Yaldwyn 1975: 214). Clear distinction between lower and upper deposits at Moa-bone Point Cave and at Moa-bone Point indicated that the demise of the moa was followed by an increase in the harvesting of shellfish from a mixture of estuarine, rocky shore, and open beach environments, predominantly tuaki, pipi, whetiko, kutai, and tuatua (Haast 1874b: 87; Yaldwyn 1975: 219).

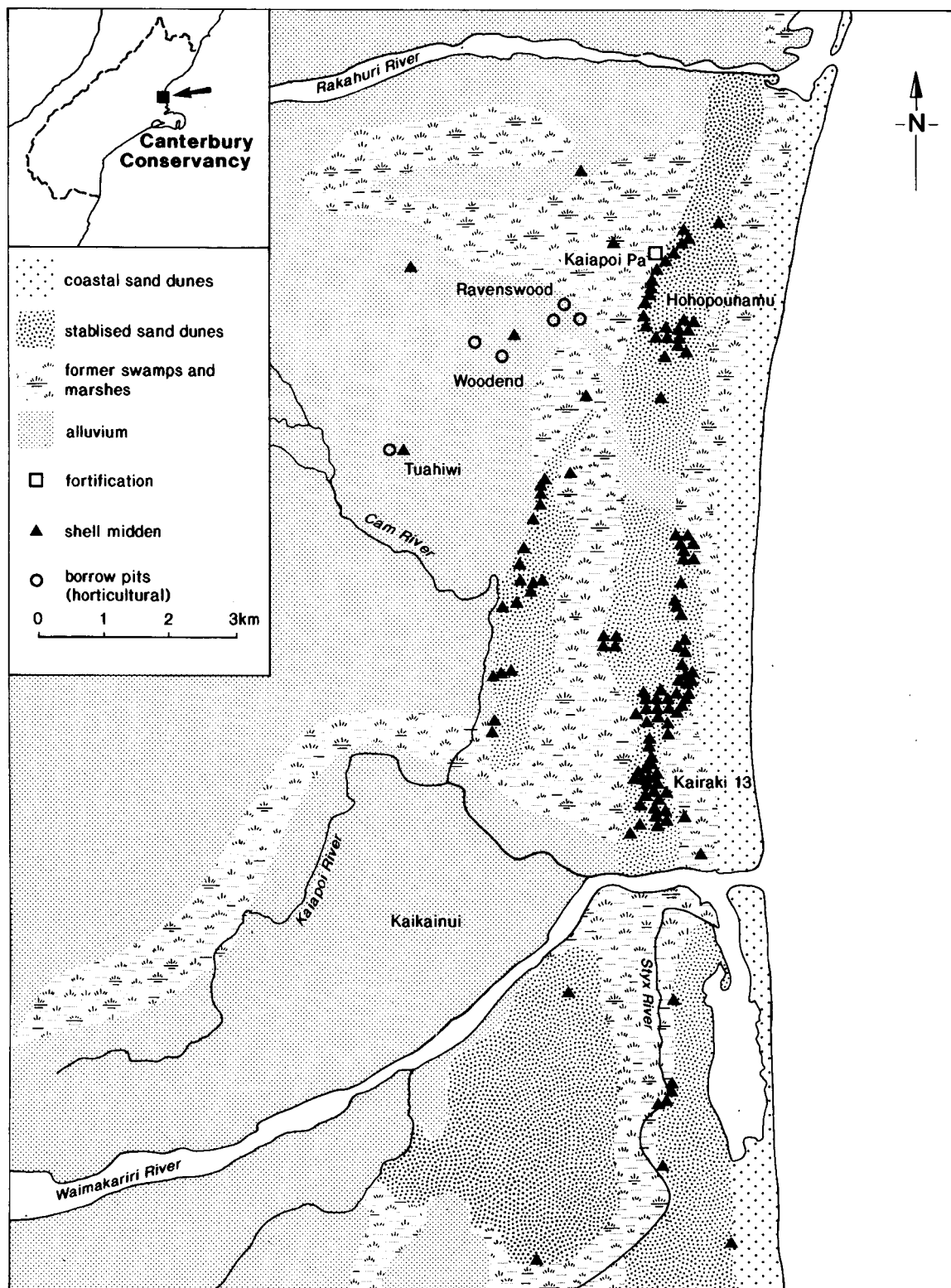


Figure 9 Distribution of recorded archaeological sites, Kaiapoi-Woodend locality (data from site record forms; soil types from Kear *et al.* 1967).

Two of the 140 recorded shell midden sites in the inner dune belt north of the Waimakariri River have been investigated: Hohouponamu and Kairaki 13 (marked on Figure 9). Stratigraphy at Hohouponamu indicated that whereas tuatua from the open beach was practically the only food item in the first occupation (large numbers of small shells; possibly fifteenth or early sixteenth century, NZ 1375), in later layers the diet changed to the common estuarine species (NZ 1158, probably seventeenth or eighteenth century; Burrage 1975). A radiocarbon date from the lowest layer of the shell midden at Kairaki 13 (NZ 781) suggests first occupation in the range from the late fifteenth to the early seventeenth century. If these sites are representative of the many similar shell middens in the dune belts north of Horomaka, they indicate substantial exploitation of and reliance on shellfish in this later period.

Although the evidence generally suggests a localised shellfishing strategy, marine shells are occasionally found in middens some distance from source environments, suggesting trade or the carrying of food by travellers. Rocky shore species have been noted in small quantities in middens at Kaiapoi, Woodend, and Styx, indicating transport from south of the Otago-Opawaho Estuary (M35/12, 86, 108, 139; paua, mussel, pupu, and maihi; site record forms). Toritori or black edged mussel has been recorded at Rakaia River Mouth, 40 km distant from likely Horomaka sources (Trotter 1972a: 137). Marine shell representing food supplies carried inland has been found at rock shelters at Weka Pass (Pentland Downs, Trotter 1982: 90; and Timpendean, 280 g of marine shell of 8 species, mainly pipi and paua, Trotter 1972b: 45). At an umu ti site at Landsborough Road near Timaru, 4 km from the coast, the shrivelled meat of kutai or green edged mussel was recognised (Fankhauser 1986a: 62; oven LO-4, NZ 6422, thirteenth century, but probably substantial inbuilt age). Heaps of pipi shells found far back in the mountain ranges were reported in the nineteenth century (Haast 1877: 46).

Some marine shells had functional or ornamental utility. Paua and mussel shells were used as containers (e.g., Monck's Cave, Skinner 1924: 159-160; Moa-bone Point Cave, Haast 1874a: 61; Teviotdale Cave, Trotter 1975c: 224). Paua shell fragments found in rock shelters may have remained from either food or from artefacts (e.g., Tengawai Gorge, Hamilton 1897: 25; Gooseneck Bend, Ambrose 1970: 407). Some shells were drilled for suspension as ornaments (e.g., *Maoricolpus roseus*, Redcliffs Flat, Trotter 1975b: 202, fig. 9: 14, 15; *Penion* sp., Rakaia River Mouth, Trotter 1972a: 143). The small deep-water species *Dentalium nanum* was used threaded into garments or necklaces (e.g., McCormicks Bay Road, Redcliffs; Harrowfield 1969: 101), and the larger fossil species *Dentalium solidum* was cut or grooved into necklace units (e.g., Motunau, Duff 1956: 98). *Dentalium nanum* appears more common in later sites (78 pieces of *D. nanum* and 1 piece of *D. solidum* at Hohouponamu; Canterbury Museum information), and *Dentalium solidum* more frequent the early period (Orchiston 1974: 2.281-284).

Kakahi or freshwater mussel occurs in lakes and rivers throughout Canterbury (*Hyridella menziesi*; Dell 1969: 487). It has been widely recorded in archaeological deposits (Figure 10, Appendix 8), near the coast (16 sites), on the plains (3 sites), and in rock shelters (17 sites), and particularly near Waihora (Lake Ellesmere). In nine of these contexts the shells were in association with moa bones, indicating early exploitation (notably Moa-bone Point Cave lower deposits, Rakaia River Mouth, Wakanui, and Gooseneck Bend). Kakahi

has also been found at fortification sites and late period kainga (Kaiapoi, Birdlings Pa, and Waikakahi), indicating continued availability.

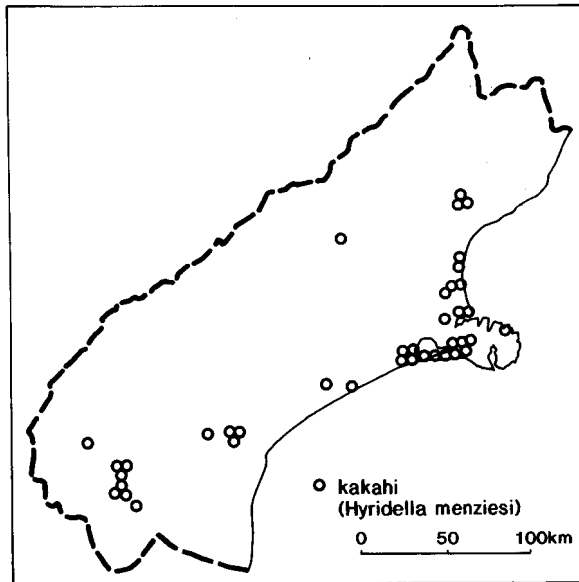
## **2.7 Kumara horticulture**

The southernmost archaeological evidence in New Zealand of the kind usually associated with Maori kumara horticulture has been recorded in parts of coastal Canterbury. This was the region in which increasing latitude forced the abandonment of this subsistence activity because of the cooler and longer winters and shorter summers. Stone and earth rows and drain or ditch systems (Appendix 9.1) occur on Horomaka (Banks Peninsula; 10 reported sites; Harrowfield 1969: 98-99; Brailsford 1981) and possibly also at Gore Bay (McCulloch 1983). It is notable that these localities have a particularly low incidence of frost. The most extensive recorded site is at Panau (about 5 ha; Figure 11; Brailsford 1981: 162), where the earth lines are generally from 5 to 10 m apart. Evidence of borrow pits from which sand or gravel may have been removed, and the garden soils to which these materials may have been applied (termed plaggen soils by McFadgen 1980), have been reported at eight sites (Appendix 9.2). The best authenticated borrow pits are in the Kaiapoi area (about 16 pits; Walton 1985; Beattie 1994: 301; marked on Figure 9). Sites further south are unconfirmed (Lockerbie 1950: 81-82; Griffiths 1955: 233; Walton 1982: 25). No Canterbury horticultural sites have been investigated to determine the period of their use.

Very few pits recorded in Canterbury appear to be of the type usually interpreted as kumara storage pits and common in areas where pre-European Maori horticulture occurred. Such pits are usually rectangular, a minimum of 3 m across, and often over 1 m deep (Challis 1991: 105). A row of four rectangular raised-rim pits on a ridge at Devils Elbow above Birdlings Flat (M36/79; site record form) appear comparable with storage pits elsewhere, but investigation is necessary to determine their function. Very few pits, apart from umu ti, have been investigated in the Canterbury region, and in no case has food storage been clearly shown. A rectangular pit 3 x 2 m across and 250 mm deep investigated at Pa Bay village had a drain extending from the centre on the downslope side (Brailsford 1981: 165, fig. 164). It was thought to be a kumara storage pit, but the interpretation is not compelling because of its shallowness and the lack of post holes.

Despite the lack of evidence from excavation, the functions of many Canterbury pits may be provisionally identified on the basis of surface evidence and comparisons elsewhere. Some were borrow pits for obtaining sand or gravel for horticultural purposes (noted above), and a few might have been for food storage. However, most Canterbury pit sites are accorded other interpretations. Shallow rectangular pits and bowl-shaped depressions, particularly on terraces or in fortifications or kainga, may have accommodated dwellings (see chapter 3.3). Although the interpretation of raised-rim pits as dwellings has been persistent in Canterbury archaeology (e.g., Brailsford 1981: figs. 137a, 137b), no detailed published investigation has substantiated the claim. The majority of Canterbury pits, typically round depressions with raised rims, associated with burnt stones, were probably earth ovens (see chapter 2.8).

The practicability of pre-European Maori kumara cultivation in the Christchurch area, near the southern limits for the crop, has been assessed experimentally (Law 1969: 240;



**Figure 10** Distribution of kakahi or freshwater mussel shell (*Hyridella menziesi*) in archaeological deposits (data in Appendix 8).

warmer climate in the thirteenth to fourteenth century when conditions for kumara growing were more favourable (Grant 1994: 166, 183).

Maori horticulture apparently developed rapidly following the introduction of European crops. Potatoes were traded on Horomaka in the 1820s and 1830s, and potato plantations were recorded in the vicinity of most of the major Maori settlements in Canterbury in the 1830s and 1840s (Anderson 1988: 29-36). It has been suggested that traditional kumara horticultural practice was applied to the potato in some areas (Leach 1984: 99). The archaeological evidence of stone and earth rows, borrow pits, and garden soils in Canterbury is distributed particularly near the Horomaka bays and near Kaiapoi, and also claimed near Taumutu and Temuka, where permanent Maori settlement and gardening were documented in the early nineteenth century. This encourages the suspicion that much of the archaeological evidence might be associated with the early success of European crops.

## 2.8 Other plant foods

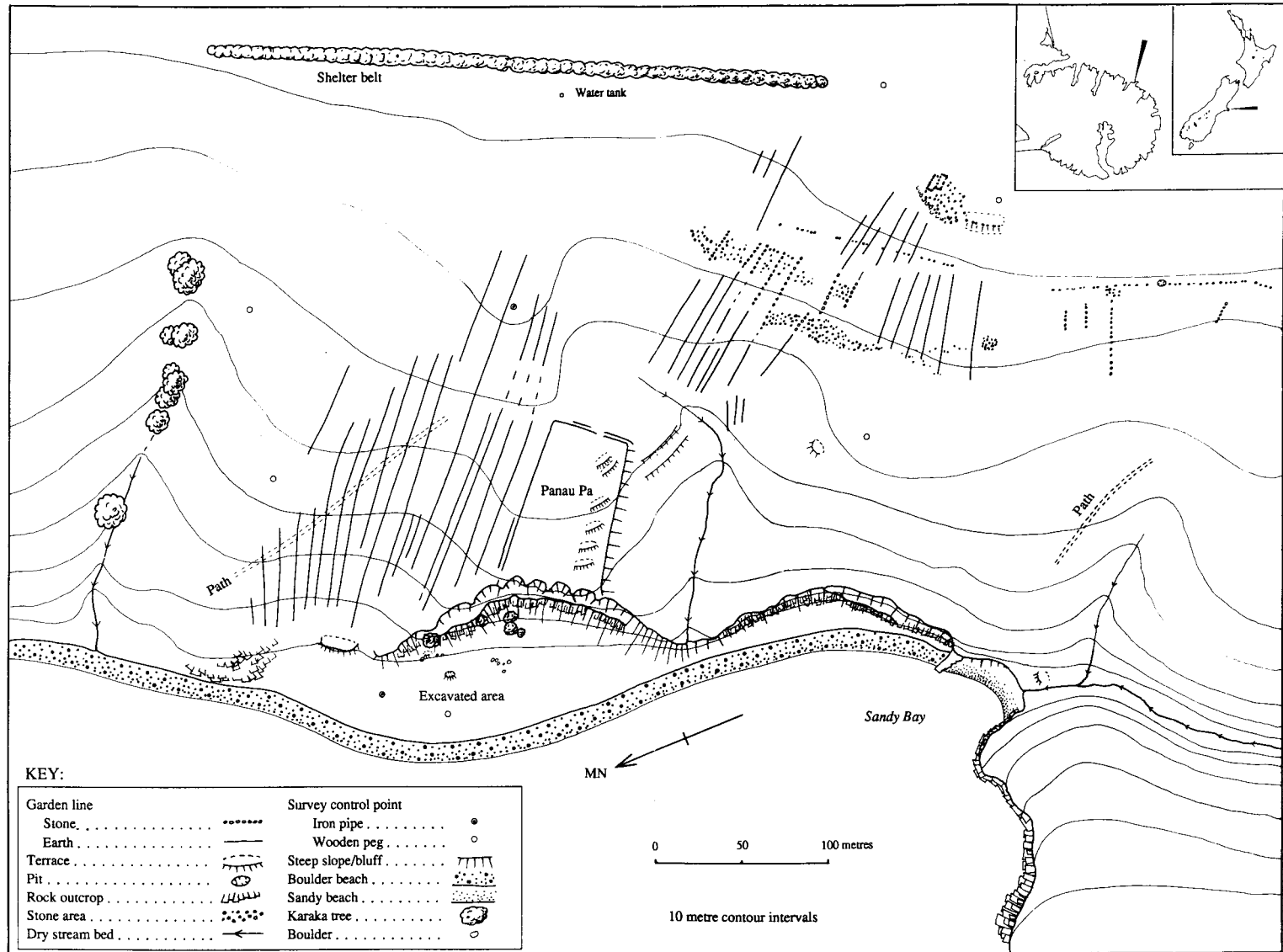
Although kumara horticulture may have been relatively unimportant in the Maori economy of pre-European Canterbury, other horticultural practices may have been significant in some areas. For example, tree cropping of ti kouka (the cabbage tree, *Cordyline australis*), and possibly orcharding of karaka trees (*Corynocarpus laevigatus*) in sheltered locations, should be regarded as regular horticultural activities.

The archaeology of the cooking of the stems and rhizomes of ti kouka in south Canterbury has been studied in detail (Fankhauser 1982; 1986a; 1986b; 1992). Fifty-five umu ti sites (earth ovens used to cook ti kouka) are clustered in the foothills of the Hunters Hills (Te Tari a Te Kaumira) and the hills near the Waitaki River (Figure 12), away from

Horn 1993) and has been found to be extremely marginal. Although a surface sand mulch improves the yield and the plants survive drought well, absolute yields vary wildly. Serious problems arise from variability in the weather, uncertain spring sprouting, and rotting during winter storage. The high probability of crop failure suggests that kumara horticulture may have been at best a supplementary activity in coastal Canterbury, small in scale, and economically relatively unimportant. Nevertheless, kumara cultivation took place in the early nineteenth century near Kaiapoi and on Horomaka (Leach 1969: 65). It has been suggested that the heyday of southern kumara horticulture was earlier rather than later in the pre-European period (Davidson 1984: 193), perhaps in an interval of possibly

**Figure 11**  
**Archaeological map of the Panau sites, Little Akaloa Bay, Banks Peninsula: excavated occupation area (N36/72), possible fortification (N36/73), and horticultural site (N36/74).**

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permanent settlement sites, in an area where conditions are favourable for ti kouka. Umu ti are usually identifiable as round raised-rim pits 2 to 4 m across (rarely up to 6.8 m) in groups of 2 to 4 (maximum 7), located close to sources of water and suitable greywacke oven stones. The lack of associated faunal remains, the presence of appropriate plant fibre and amino-acid residues, and the existence of ti kouka in the vicinity indicate their usage.

The umu ti were constructed and used as described in ethnographic accounts (e.g., Beattie 1994: 297). Stems and rhizomes of young ti kouka were taken when carbohydrate levels were highest, between late spring and autumn, and were steamed for up to two days. The steamed material (kauru) could be dried for later use. Large ovens are often located adjacent to small ovens and pits. Small shallow ovens adjacent to the large ones may have had a ceremonial use. Adjacent pits were borrow pits for earth to cover the ovens while cooking. The raised rims around the ovens were throw-off after cooking. Often the ovens were used more than once. Ti kouka may have been replanted and transplanted, as a regular horticultural activity.

Radiocarbon dates of charcoals from short-lived species (see Figure 2) suggest that umu ti were used particularly in the fourteenth and fifteenth centuries and from the eighteenth century until European settlement. It is concluded that kauru was a significant part of the diet at these times and probably throughout the pre-European Maori period. The size of the ovens and ovenstones used increased over time. Late in the sequence, umu ti were rectangular rather than round (rectangular ovens at Limestone Hills and Holmeview, south-west of Waimate; radiocarbon dates listed in Appendix 2).

Earth oven sites known to have functioned as umu ti have a restricted distribution (Figure 12). It has been suggested in the light of Fankhauser's detailed study that most round raised-rim pits in the South Island are likely to have been umu ti (Anderson 1986: 95), but no comparable research has been carried out. A single isolated oven 1.25 m across excavated at Mt Donald, north Canterbury (NZ 1286, eleventh to twelfth century, indeterminate inbuilt age), was thought to have been used for plant foods on the basis of the lack of faunal remains (Orchiston 1977: 115). Round raised-rim pits (about 30 sites) recorded on Horomaka (Banks Peninsula), often singly or in groups of up to 8, have also been interpreted as ovens (Jones 1962: 115), partly because any disturbance usually showed fire-blackened stones. Many may have been in forest edge environments where ti kouka occurred. However, it should not be assumed that all such ovens were used for cooking plant foods. For example, a pit at Port Levy, 1.7 m across and 500 mm deep, held an accumulation of oven stones, charcoal, and marine shells (N36/27; site record form). In contrast with the south Canterbury umu ti, Horomaka raised-rim pits frequently occur on ridges or headlands at a distance from fresh water, and are often smaller (in the size range 1.0 to 3.5 m across). None has been excavated. A hollow 2 m across at Onawe was found on excavation to be an oven (Trotter 1986a), but the material cooked has not been documented.

Earth ovens were commonly encountered on some parts of Ka Pakihi Whakatekateka o Waitaha (the Canterbury Plains) and the margins of the foothills when breaking up land in the nineteenth century (Smith 1900: 428). Recorded remnants (plotted on Figure

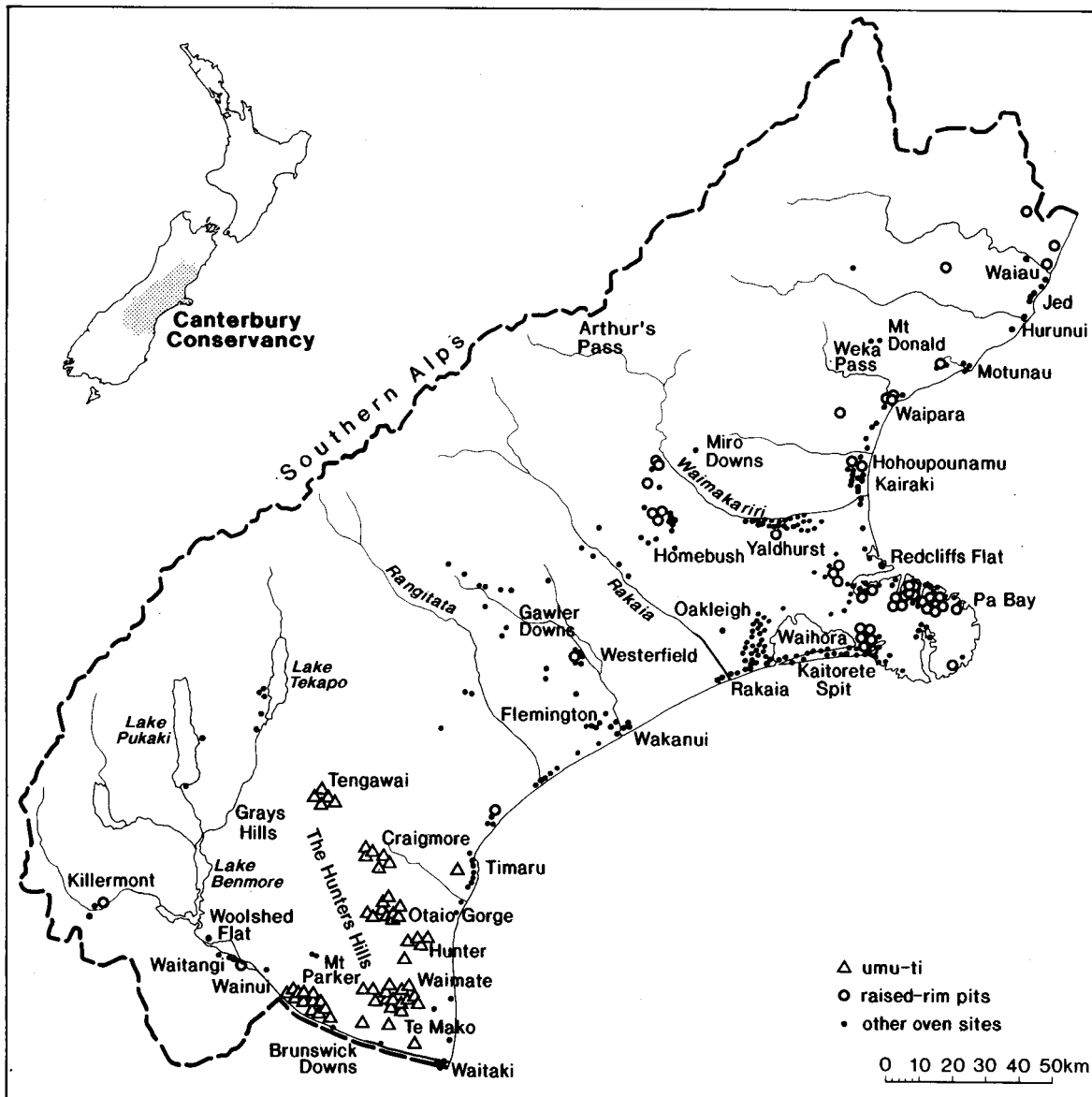


Figure 12 Distribution of recorded oven sites (data from site record forms; Fankhauser 1986a: fig. 2.2; Orchiston 1974: fig. 2.155; Trotter 1973b: fig. 1).

12) are either pits (generally 1 to 2 m across, occasionally up to 3 m) or accumulations of oven stones and charcoal seen in ploughed soil. There is a particular concentration of oven sites near streams on the edge of the foothills near Homebush (L35/12-21). Notable oven sites on the river terraces include 6 groups in the Westerfield locality (K37/6-11) and 4 at Flemington (K37/12-15) on the south side of the Hakatere River; 3 groups near Oakleigh on the north side of the Rakaia River (L36/6-8; site record forms); and 13 clusters of ovens south of the Waimakariri River near Halkett and Yaldhurst (Rains and Rains 1992; radiocarbon dates S 2802 and S 2804; S 2802 from the less disturbed context, mid-fifteenth to mid-seventeenth century). When in use these sites may have been close to watercourses and in shrubland or grassland environments. Use of the ovens as umu ti is conceivable but has not been tested.



In contrast with the well researched evidence of ti kouka exploitation, there is little archaeological evidence of the gathering of the other edible plant products which were available in Canterbury (over 30 listed by Leach 1969: 33-35, 90-97). Second in importance after ti kouka in the ethnographic literature is aruhe (bracken fern rhizome, *Pteridium esculentum*), thought to have been widely harvested from favourable forest margins and open ground environments. Possibly related to its use are beaters recovered from Monck's Cave, Moa-bone Point Cave, and the Ashburton area (Skinner 1924: pl. xxix: 9b; Trotter 1975b: fig. 12: 3-4; Smith 1900: 429, 431, pl. xvi: 6, 9). Excursions to obtain raupo rhizomes (*Typha angustifolia*) might be represented by over sixty ovens or groups of ovens dispersed in pockets of better drained land in the swamps on the western side of Waihora (Lake Ellesmere; Orchiston 1974: 2.241-242, fig. 2.155; plotted on Figure 12).

Use was made of the berries of karaka trees (*Corynocarpus laevigatus*). The recorded distribution of the trees, associated with coastal archaeological sites at Gore Bay (033/5, 12; McCulloch 1983), at Napenape (N33/16), and on Horomaka (M36/67, N36/9, 14, 72, 77; site record forms) suggests that they were deliberately planted. Orcharding of karaka may have been common in sheltered coastal localities. No specialist survey of the surviving distribution of karaka trees is known to have been undertaken.

## **2.9 Stone materials**

As recognised by Julius Haast at Rakaia River Mouth and Moa-bone Point Cave over a century ago (Haast 1871: 82-85; 1874a: 83, 85), Canterbury moa-associated sites contain a great variety of stone artefact materials. At Rakaia River Mouth the six most common materials in order of frequency were silcrete (also referred to as sandstone, quartzite, or orthoquartzite; Dawson and Yaldwyn 1975: 216), metasomatised argillite (also called indurated mudstone), chert (nodular limestone flint), greywacke, silicified tuff (named palla by Haast), and obsidian (Trotter 1972a: 145-149). At inland moa-associated sites in the Waitaki Gorge area, silcrete is common, slate, chert, and jasper are frequent, and greywacke, schist, and obsidian are present (Trotter 1970a). Surface collecting at Tumbledown Bay yielded over twenty different stone types (Mason and Wilkes 1963b: 99-100). These collections imply that extensive knowledge of stone resources was developed by the Maori quite soon after first settlement.

In contrast, archaeological knowledge is limited and imprecise. Although the geology of most of the materials is complex, archaeological analyses have generally been based on hand specimen identification, so that the association of materials with particular source areas, and the comparability of materials from different sites, are not yet firmly established.

Three quarry sites have been recorded in Canterbury: Grays Hills and Miro Downs (silcrete) and Gawler Downs (silicified tuff; locations marked on Figure 3). At an apparently large quarry on Grays Hills station, Mackenzie Country, three trenches 4.8 m long, 2.7 to 2.5 m wide, and 1.8 m deep have been reported, from which an estimated 100 tons of silcrete of varying quality and colour had been removed (Irvine 1943). Thirty years later, probably at the same site, eight quarry pits were recorded and flaking areas were excavated (138/1; Trotter 1970b; 1977: 361). A separate large flaking area of white silcrete (source not established) was recorded nearby (139/1). At a silcrete source at Miro Downs, Oxford (L35/23; Griffiths 1960), outcrops extending over 2 km showed signs of utilisation, and

cores, flakes, and knives have been reported. The stone is mainly grey but fawn and pink are also present. The silcretes at the Grays Hills and Miro Downs quarry sites have not been described in detail geologically, and the distribution of these materials on other archaeological sites has not been established.

Near the Surrey Hills homestead at Gawler Downs, near Mt. Somers, a source site of distinctive green silicified tuff (the type of chert termed palla by Haast) has been reported (K36/1; Haast 1871: 85; Orchiston 1976a; Moore 1977: source 56). Relatively small numbers of artefacts of green material of this description, mainly of earlier rather than later type, have been found in the area between the Opawaho (Heathcote) River and the Waitaki River (Orchiston 1976a: fig. 1), notably a cache of rough-out adzes from Rakaia River Mouth (Figure 13; Duff 1956: 254). Artefacts in similar stone but in colours other than green, ranging from grey to purple and from cream to brown, are held in the Canterbury Museum. Metasomatised tuff outcrops intermittently in the Gawler Downs area. Other potential chert sources have been identified in the Mt Alford and Mt Somers localities (Moore 1977: sources 54 and 55), and one other possible quarry site has been recorded (Mt Alford, K36/2; site record form).

Basalt or andesite, thought but not proven to be of Horomaka (Banks Peninsula) origin, was commonly used for adzes and scrapers. Exploitation of surface boulder basalt was recorded by Reg Nichol in 1990 at nine locations on the eastern shores and lower hill slopes bordering Wairewa (Lake Forsyth; M36/108-114, M37/158-159). The boulders are less than 1 m<sup>3</sup> in size and bear flake scars. Waste blocks and flakes, possible hammerstones weighing about 1.5 kg, and discarded adze preforms (M36/113 and M37/154) have been recorded. Basalt adze flakes of three different varieties probably of local origin were found at Takamatua (Trotter 1973a: 77). Areas where adzes were flaked out of basalt regarded as local have been excavated at Tumbledown Bay (Allingham 1988). At Redcliffs Flat, cores and flakes of basalt, which made up the largest proportion of lithic material, were thought to be local (Haast 1874a: 77, 85; Trotter 1975b: 198-199), but samples from Hamilton's deposit were considered to be distinct from any of the basic volcanic rocks of Horomaka and likely to have been derived from east Otago (Dawson and Yaldwyn 1975: 218).

Other utilised Horomaka materials include Charteris Bay sandstone (Lyttelton Harbour; Allingham 1988), haematite (Burrage 1975), and Panau flint, a conchoidally fracturing volcanic airfall deposit (Jacomb 1995: 95). Pitchstone, a low quality flow-banded obsidian which outcrops near Gebbies Pass (Tara-o-te-rangi-Hikaia; Andersen 1927: 72; Canterbury Museum information; Davidson 1984: fig. 23), may have been utilised and may occur rarely in archaeological contexts (e.g., Tumbledown Bay, N37/12; site record form).

Rounded cobbles of greywacke are common on Canterbury river beds and beaches and were widely utilised in the region. There is an almost exclusively Canterbury distribution of adzes of green and grey greywacke (Orchiston 1974: fig. 2.12; greywacke adzes discussed in more detail below). In some coastal sites, items derived from greywacke beach cobbles form the greatest bulk of stone material (e.g., Tumbledown Bay, Allingham 1988; Normanby, Griffiths 1941: 230; 1942: 125; Dashing Rocks, Mason and Wilkes 1963a: 95). Sub-circular flakes or spalls, usually in the size range 50 to 150 mm long, struck from greywacke



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**Figure 13** Rough-out adzes in Gawler Downs silicified tuff (palla) from Rakaia River Mouth (photograph by Chris Jacomb, Canterbury Museum, descriptions in Appendix 13.2).

cobbles, are abundant on coastal sites of all ages south of Horomaka (e.g., Haast 1871: pl. vii, 2; Griffiths 1941: figs. 40-47). They are found on sites associated with moa-hunting, and are thought to have been used as knives for cutting or scraping soft materials such as meat or wood (in the archaeological literature known as teshoa, a Shoshone Indian word for similar tools; Anderson 1989a: 158-159). Analysis of the Normanby spalls has indicated a wide variety of edge forms (Walker n.d.). In the later period, similar spalls were used as attrition saws for bone or stone, particularly for the scarf-sawing of greenstone (Trotter 1972a: 141; see also Figure 23K and L; 2 of the 86 greywacke spall cutters from Hohoupounamu). Greywacke cobbles were also commonly used as hammerstones (usually from 100 g to 1.3 kg; Skinner 1974: 124-130).

Two types of adzes found almost exclusively in Canterbury may have been designed for specialised functions and manufactured within the region, perhaps in the middle to late pre-European period (not found in association with moa bones). The first type, known as the Canterbury Plains shallow adze, or "Canterbury wedge" (Duff 1976: 5; Orchiston type J3, 1974: 2.180-181), is usually in basalt, and is characteristically thin in section, occasionally gripped, and bifacially bevelled to a sharp fragile acute-angled edge (Figure 14).

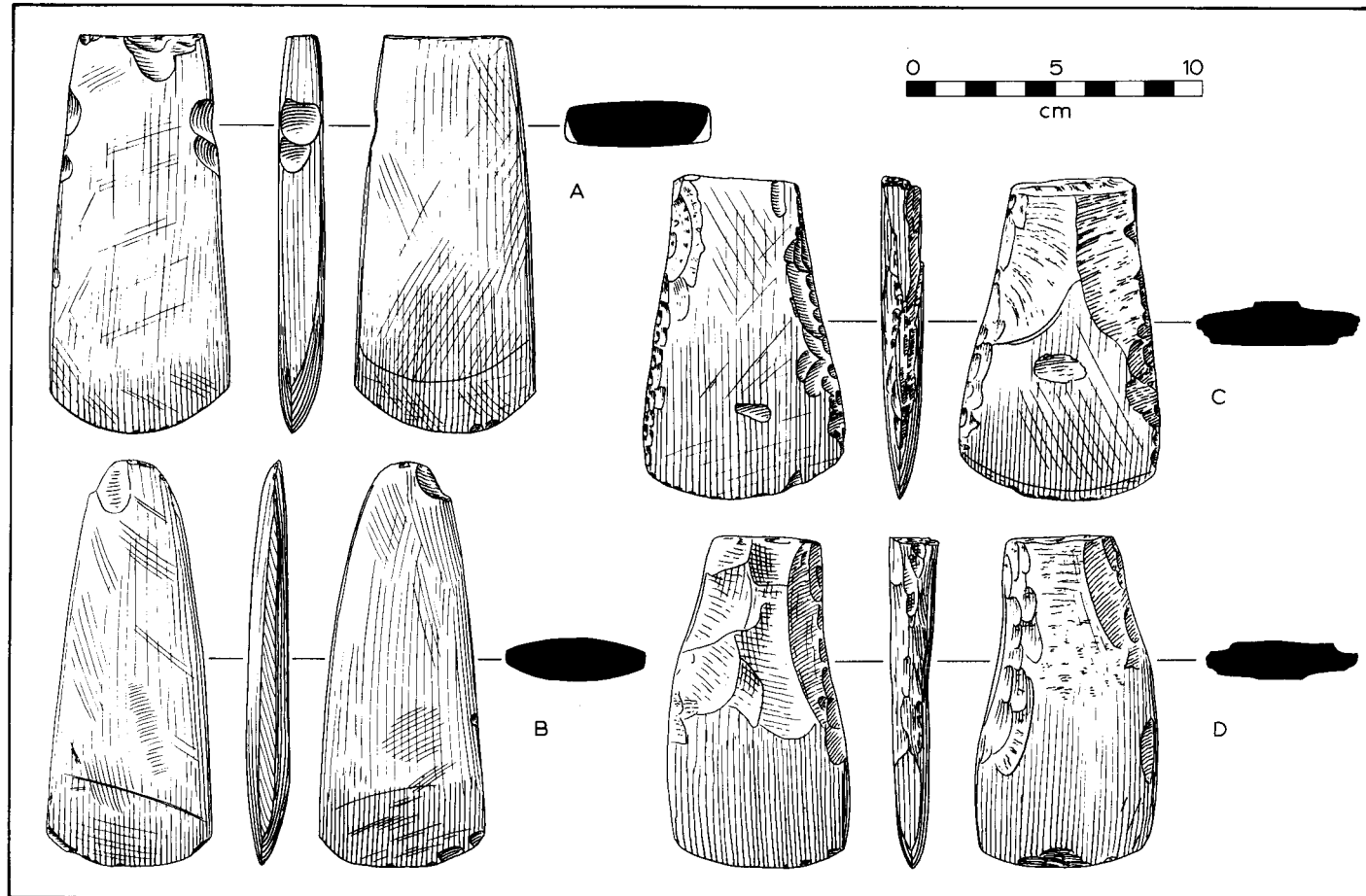


Figure 14 Basalt adzes of "Canterbury wedge" type (Orchiston type J3) from the Tai Tapu locality (descriptions in Appendix 13.3).

The dispersed distribution (Orchiston 1974: fig. 2.118), mainly on the plains away from known settlement sites, suggests a specialised function. Uses which have been proposed include skimming ti kouka bark and rootlets and cutting stems into lengths (Duff 1976: 5; Fankhauser 1986b: 233), or digging up raupo rhizomes (Orchiston 1974: 2.242). The form might have been suitable for clearing light bush or shrubland.

A second type of adze with a similar dispersed distribution, termed the "sugar adze" (Duff 1976: 4), is nearly always in greywacke from water-rolled stones, and is oval or sub-rectangular in section, often gripped, and again bifacially bevelled (Figure 15; Duff 1976: 4-5; Orchiston type K3, 1974: 2.181-186, fig. 2.121; two large examples from Waimate, Collett 1965). The characteristically obtuse edge angle, which is blunt and not well suited to woodworking, and the relative fragility of greywacke, have suggested use as a digging implement, perhaps for aruhe rhizomes (Collett, 1965: 485) or for ti kouka rhizomes (Duff 1976: 4-5; Orchiston 1974: 2.242). It might have been suitable for felling small trees and shrubs. Although adzes of both types (Orchiston types J3 and K3) are known from the south Canterbury downlands where ti kouka exploitation occurred, the distributions are much wider than this, particularly in the low-lying relatively swampy areas west of Horomaka (Orchiston 1974: fig. 2.154).

Red argillite was used for adzes, knives, and minnow shanks. Such distinctively coloured artefacts may have had ceremonial importance (Holdaway 1984: 198-201; e.g., a minnow-shaped lure shank from Rakaia River Mouth, Trotter 1972a: fig. 4a). The artefacts have a restricted distribution from the Opawaho (Heathcote) River southwards (Orchiston 1974: 2. 79-83, fig. 2.26). Some of the material may have been obtained from south Canterbury river beds (Moore 1977: 64). Other useful materials probably collected from river and beach deposits were silicious sandstone, schist, opal, agate, and jasper (Haast 1871: 82-83).

The utilisation of jasper and chert from north Canterbury sources was suggested over thirty years ago (Parry 1960: 13; Moore 1977: sources 50-53), but their distinction from Marlborough cherts has not been researched. Flakes of chert (nodular limestone flint), of the sort usually associated with the Amuri limestone of the Kaikoura coast, are common on sites in northern and coastal Canterbury (e.g., Redcliffs Flat; Dawson and Yaldwyn 1975: 217-218).

Stone materials foreign to Canterbury are frequently found on archaeological sites, demonstrating extensive and complex systems of pre-European contact and distribution. Usage of obsidian (northern North Island origin) was widespread at all times, particularly on sites with moa association. Quantities were generally small, but large cores have been reported from early sites at Waiau River Mouth, Hurunui River Mouth, and Rakaia River Mouth (Parry 1960: 13; Duff 1956: 275; Haast 1871: 98). Obsidian flakes have been found at inland rock shelters (Timpendean, Trotter 1972b: 47; Gowan Hill, M34/4, site record form; Hazelburn, J38/28, site record form; Craigmore, J39/2, McCulloch 1984). Sourcing of obsidian artefacts by x-ray fluorescence spectroscopy has shown that Mayor Island (Bay of Plenty) was the main source of early assemblages: 68 of 86 obsidian samples from Redcliffs Flat, and 21 of 25 samples from Waitaki River Mouth (Seelenfreund and Bollong 1989: 179-180; closely comparable with other results shown in Table 2). On later sites, patterns of obsidian supply were more proliferated.

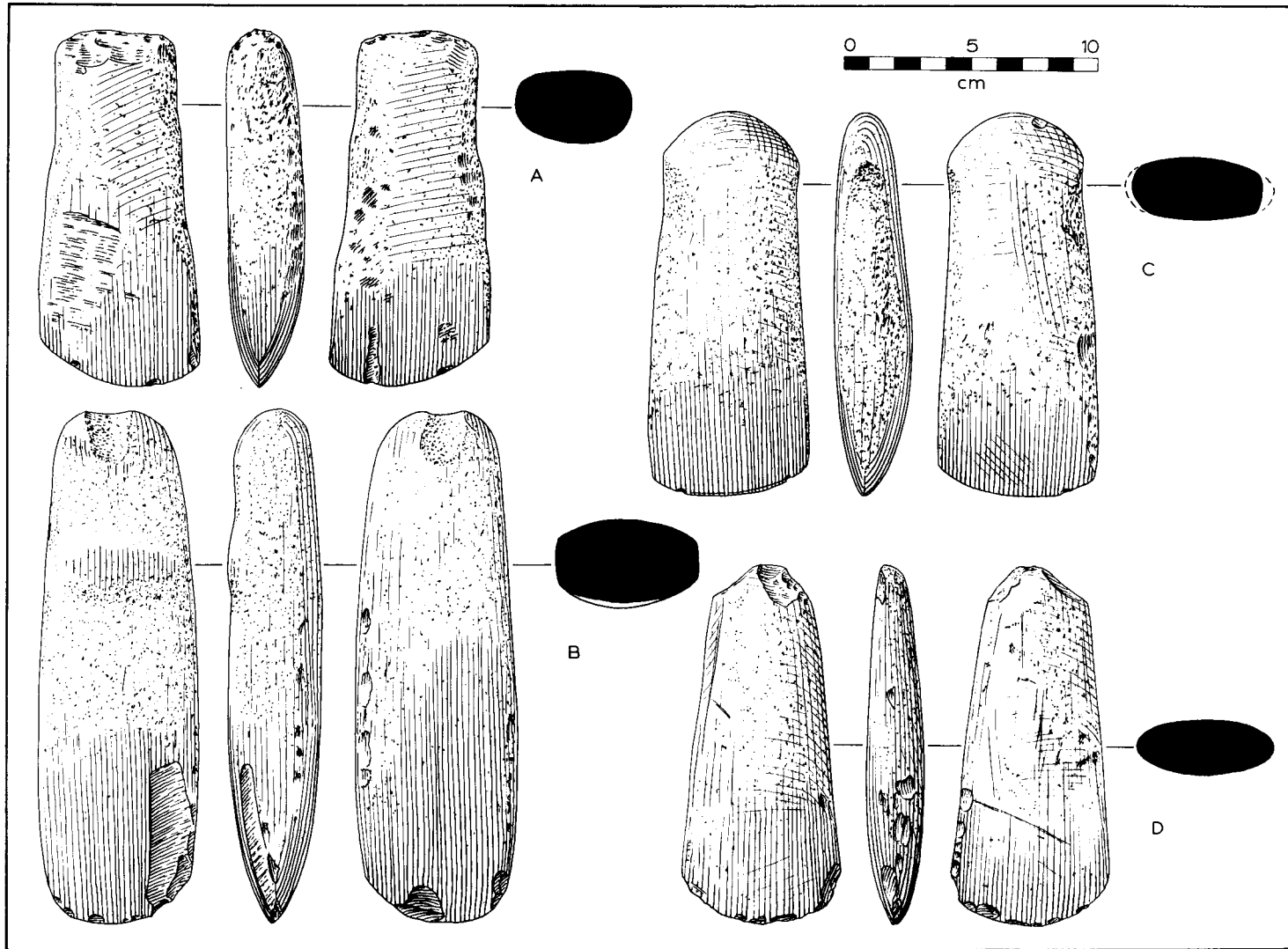


Figure 15 Greywacke adzes of Orchiston type K3 from the Tai Tapu locality (descriptions in Appendix 13.3).

Nephrite, semi-nephrite, and bowenite (collectively termed pounamu or greenstone), from a variety of sources beyond Canterbury to the west and south west, have been reported in substantial quantities from Canterbury coastal sites of the late period (Turner 1935). Greenstone working appeared to be the main activity at Hohoupounamu, particularly in the upper levels (44% of stone flake material, over 2,060 flakes and over 100 worked pieces, compared with over 1,730 fragments of Amuri chert, 331 of quartzite, and 259 of obsidian; Canterbury Museum information). Percussion flaking methods were predominant (e.g., flake adzes and chisels, Figure 23C, E, F, G), but there is some evidence of scarf-sawing (Figures 23H, 24Q). Greenstone working appears dominant at other late sites (e.g., Pa Bay, Brailsford 1981: 171; Panau, Jacomb 1995: 63, 65-66; Greenstone Island near Temuka, K38/11, Turner 1935: 208-210; Ikawai near the Waitaki River, Vincent 1980b: 34-36). A substantial scale of greenstone working and trade in the later eighteenth and early nineteenth centuries is suggested, possibly related to the stimulation of demand by European contact (Orchiston 1974: 2.85-2.93).

By comparison, in the early period, in association with moa bone, the scale of greenstone working in Canterbury was modest. Greenstone was only the eighth most abundant lithic material, both from the Wakanui excavations (Canterbury Museum information) and also from surface collecting at Rakaia River Mouth (Trotter 1972a: 145, 149). A small nephrite adze (7 cm long, polished, with traces of former flaking) was found among the undisturbed stones and charcoal of an oven excavated at Rakaia River Mouth (McFadgen 1989). The presence of sawn greenstone in the earliest levels at Tumbledown Bay (Allingham 1988; NZ 7654, NZ 7745, sixteenth century) suggests long currency for sawing methods thought to be characteristic of the late period (Trotter 1972a: 138).

Adzes in veined metasomatised argillite thought to originate from the Nelson Mineral Belt have long been recognised in Canterbury (Rakaia River Mouth and Moa-bone Point Cave; Haast 1871: 95-96; 1874a: 71; see also Duff 1956: 254; Trotter 1972a: 138). Analysis of adze distributions, based on hand specimen identifications of museum and private

**Table 2 Sourcing results from obsidian artefacts using x-ray fluorescence spectroscopy.**

	Mayor Island	Ben Lomond, Lake Taupo	Whakamaru, Atiamuri	Northland sources	Total analysed
Timpendean	2	7			9
Kaiapoi pa	1			1	2
Hohoupounamu	2	7			9
Redcliffs Flat	47	8	4		59
Tumbledown Bay	6	3	1		10
Waitaki River Mouth	23	1		1	25
% of totals analysed	71%	23%	4%	2%	100%

These results are from an unpublished project by B.G. McFadgen, G.J. McCallum, and P.R. Moore which characterised about 8,000 obsidian artefacts from New Zealand archaeological sites. They are quoted with the permission of Bruce McFadgen. For project description and methodology, see Anderson and McFadgen 1990.

collections, suggests that adzes in Nelson metasomatised argillite of a range of forms thought to be characteristic of the early period, or the stone materials from which they were made, were brought into Canterbury from the north (Orchiston 1974: figs. 2.50 and 2.63); and that adzes in Bluff and Riverton metasomatised tuff and metaconglomerate, or the relevant stone materials, were brought into Canterbury from the south (Orchiston 1974: fig. 2.24).

However, adze forms thought to be typical of Southland (Duff type 1D), and certain chin-ridged adze types characteristic of the northern South Island in the later period, are rare in Canterbury (Orchiston 1974: figs. 2.87, 2.72 and 2.79). These relatively exclusive distributions, together with the adze forms characteristic of Canterbury in the middle to late pre-European period (Orchiston types J3 and K3, discussed above), clearly indicate the development of regional cultural distinctiveness. They also suggest specific regional adze functions, and hint at the existence of territorial boundaries between regional groups.



### 3. SETTLEMENTS

Some aspects of the field evidence of pre-European Maori settlement in Canterbury have been discussed in chapter 2, notably middens, ovens, pits, horticultural sites, and stone source sites. Rock shelter sites and earthwork sites such as terraces and fortifications constitute major themes in the archaeology of Canterbury, although few have been investigated in any detail.

#### 3.1 Rock shelters

Over 50 caves and rock shelters have been recorded in the cliffs and coastal valleys of Horomaka (Banks Peninsula; see Figure 16). Occupation remains such as midden and artefacts have been recorded in most cases, but no rock drawings, for which the dark uneven surfaces are unsuitable. The best known sites are Moa-bone Point Cave (Te Ana-o-Hineraki; Andersen 1927: 45; Haast 1874a; Skinner 1923; Trotter 1975b: 190-193) and Monk's Cave (Skinner 1924). From these two caves, important collections of artefacts, notably of wood and plant textile, were obtained in the nineteenth century. Low caves and shelters have also been recorded at Teviotdale north of the mouth of the Waipara River (Trotter 1975c).

Areas with both rock shelters and rock drawings are located in south Canterbury, particularly in the Pareora, Tengawai, and Opihi catchments (over 200 sites, Fomison 1962), and in the Waitaki Gorge (13 sites, Ambrose 1970), near Lake Tekapo, and near Lake Pukaki (7 sites); and in north Canterbury, particularly in the Weka Pass area (over 50 sites, McCulloch 1968), and at Castle Hill (4 sites), Motunau (1 site), and Mt Somers (4 sites). The distribution (Figure 16) is determined by the location of suitable shelters and drawing surfaces, particularly limestone (general discussion in Trotter and McCulloch 1971). The drawings usually occur on the roofs and walls of rock shelters, in crevices, and on the faces and undersides of boulders. The shelters are typically shallow undercuts, at the bases of bluffs which form valley sides in the downlands or the margins of massifs. The sites have inspired a succession of recorders. A new systematic programme of photographic recording is in progress (South Island Maori Rock Art Project by Brian Allingham for Te Runanganui O Ngai Tahu).

Available reports indicate that the rock drawings are generally in charcoal (black), haematite (red), or occasionally limestone (pale yellow), applied dry in stick or lump form. Haematite pieces have been found in archaeological deposits in the shelters at Timpendean and Shepherds Creek I (Trotter 1972b: 47; 1970a: 449).

Recognition of the superimposition of successive drawings led Tony Fomison (n.d.) to define a relative chronology of three styles which he named Early Polynesian, Classic, and European Contact Period. Fomison's Early Polynesian Style (most numerous) depicts living subjects such as people, birds, kuri, and fish in a style of conventionalised realism, frequently in connected fashion suggestive of a narrative or an ancestry composition (e.g., Waitohi, J38/92 and 93; Figure 17 lower, Figure 18 upper). Common stylistic features are the internal blank in the torso, and flexed cusped limbs (see also Ahuriri; Ambrose 1970: figs. 5 and 6).

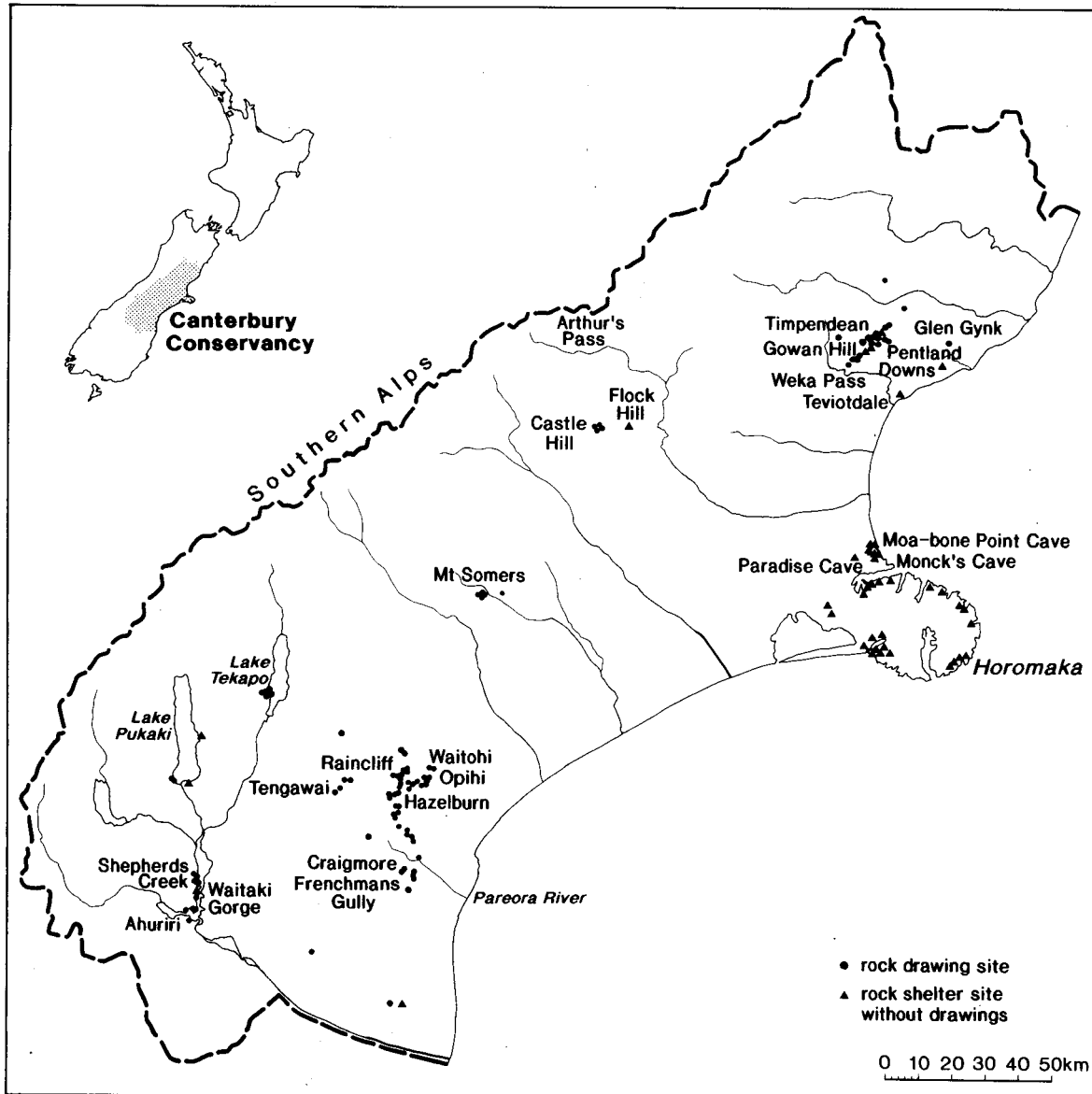


Figure 16 Distribution of recorded rock shelter and rock drawing sites (data from site record forms).

In Fomison's Classic Style there are more mythical subjects, there is greater stylisation, and there are more linear and infilled representations, with similarities to so-called Classic Maori art and artefacts (e.g., Opihi, J38/88; Figure 18 lower). Statistical discriminant analysis confirmed a highly significant difference between Fomison's Early Polynesian Style and his Classic Style (Bain 1982; 1985). Fomison's European Contact Period Style is entirely different and appears casual rather than ritualistic, with names and sentences in Maori (e.g., Opihi, J38/76; Figure 19 upper), and European subjects such as houses (e.g., Raincliff, J38/61; Figure 19 lower) and domestic animals (e.g., pigs at Opihi, J38/73; Fomison n.d.: fig. 22iv).

Distinctive local sub-styles are apparent within Fomison's south Canterbury Early Polynesian Style (Fomison n.d.; Bain 1982: 62-80). Well known representatives of Early Polynesian