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Mort Creek Site Complex

Introduction

This chapter reports the results of archaeological excavations undertaken at the Mort Creek Site Complex. Previous surveys and test excavations undertaken by Lilley et al. (reported in Carter et al. 1999) in 1995 revealed the potential of the site to contribute to a regional understanding of early coastal occupation with cultural deposits dated to before 2,000 BP. These excavations and subsequent analyses demonstrated a complex history of landscape formation, with interfingering natural and cultural shell deposits in some areas of the site. The excavations reported below were part of a detailed reappraisal of the site complex in 1998 which sought to determine its antiquity of occupation and better characterise its content and structure through controlled excavations and recording of deposits.

Site description and setting

The Mort Creek Site Complex is located on the west bank of Mort Creek, on the west coast of Rodds Peninsula (Latitude: 24°00′45″S; Longitude: 151°37′45″E) (Fig. 7.1). Natural and cultural shell deposits extend discontinuously over an area of about 6ha characterised by a complex of beach ridges, cheniers, shell middens and tidal inlets. The deposits are associated with a probable stone-walled tidal fishtrap and a possible stone monolith (Figs 7.2–7.3). This entire area is referred to collectively as the Mort Creek Site Complex. The deposits front the shallow, open waters of Rodds Harbour to the south and west and a large area of mangroves and intertidal flats to the east. Mort Creek is a minor estuary of Rodds Harbour, which comprises an extensive estuarine system sheltered from full oceanic conditions by Rodds Peninsula. According to Olsen (1980a:18), Rodds Harbour has no brackish zone, despite periodic freshwater inflow from Worthington Creek at its southeast extremity. Seagrasses and soft corals occur at the mouth of Mort Creek. The lower two-thirds of Mort Creek are dominated by dense stands of spotted mangroves (*Rhizophora stylosa*),

with a low shrubland of yellow mangroves (*Ceriops tagal*), fringing saltflats to the north of the site and patches of tall grey mangroves (*Avicennia marina*) interspersed in the spotted mangrove forest in the northern half of the estuary. The main area of shell deposits is vegetated by microphyll vine forest with emergent Moreton Bay ash (*Corymbia tessellaris*). The exposed southern margin fronting Rodds Harbour is fringed by black she-oak (*Allocasuarina littoralis*). The understorey is frequently closed with introduced weeds including prickly pear (*Opuntia stricta*) and lantana (*Lantana camara*). Intertidal flats adjacent to the site include areas of muddy and shell/rocky debris substrates which support dense populations of telescope mud whelk (*Telescopium telescopium*) and occasional mud ark (*Anadara trapezia*) and razor clam (*Pinna bicolor*).

A low chenier ridge extends southwest beyond the mainland into Rodds Harbour, terminating in a rounded area vegetated with spotted mangroves (Fig. 7.3). Shell ridges observed in the area generally have a northeast-southwest orientation. A narrow projection of land marked on Bedwell et al.'s 1870 chart running over a kilometre south-southwest from the current Spit End may have been a western extension of such shell deposits (Fig. 7.1). This feature may have exerted considerable structural control over patterns of sedimentation to the east during its existence.

Evidence for non-Indigenous use of the site area is limited. There has been a permanent European presence on the peninsula since the late 1890s and extensive cattle grazing from the 1920s (Buchanan 1999:76). There is virtually no material evidence for activities associated with European occupation in the site area, with the exception of introduced weeds and a four wheel drive track which transects the site. Dams and fencelines are common features in other parts of Rodds Peninsula. The Queensland Parks and Wildlife Service (QPWS) has breeched some dams and demolished residential structures associated with the former grazing lease at Richards Point, although the remains of terraced gardens, exotic plantings and scatters of glass and metal remain. The Rodds Peninsula Section of Eurimbula National Park has been closed to public vehicle access since gazettal in October 1990 (QDEH 1994), limiting recent use of the area. Mort Creek is frequented today by recreational crabbers, with access by small boat from the nearby townships of Turkey Beach and Tannum Sands.

A possible stone-walled tidal fishtrap was identified during surveys on the western margin of Mort Creek, approximately 50m east of the excavation grid for Squares A–D (Fig. 7.2). The oyster-encrusted rocks appear to be anthropogenic extensions of the larger boulder outcrops which extend towards the creek from the area of The Granites excavation (see below). The rocks on the intertidal flats are much smaller than those under the canopy of the adjacent mangrove fringe. The portability of these smaller rocks and the absence of larger boulders in this area suggest that the rocks were transported to extend oyster habitats and/or to form a stone-walled trap. The feature consists of several tiers of rocks, with lower tiers visible through the top of the mangrove muds. The rocks form two low, linear banks which are raised above the level of the surrounding flats by accumulating muds. Although the two arcs curve towards each other, they do not meet. It is possible that the eastern end was at times enclosed by saplings or nets as documented in other parts of southeast Queensland (Petrie 1904:72–3). The southern arc appears to be broader than the northern one. The feature is not visible on low level aerial photography, discounting this avenue for investigating the antiquity of the structure. Oyster leases were established at nearby Bustard Head by 1909 (Buchanan 1999:76), but no records were found for such activities in Mort Creek. The abundance of fish remains recovered from the adjacent cultural deposits provides circumstantial evidence for an Indigenous origin of the feature. The structure is thus tentatively identified as an Indigenous stone-walled tidal fishtrap.

A large standing block of microgranite is located adjacent to the four wheel drive track c.25m west of the excavation grid (Fig. 7.2). In this area, the basal microgranite bedrock underlying the ridge is exposed and several large boulders of microgranite sit on the exposed rock. One of these large roughly triangular-shaped stones has been placed in an upright position. As no other

information for the origin of the stone monolith is currently available, its attribution to either an Indigenous or European origin remains uncertain. Horton (1994:1029) classifies such features as stone arrangements.

Previous investigations

Shell deposits in the area were initially reported by Burke (1993) as sites CC-067 and CC-068 during a heritage management study of the Curtis Coast and were described as an Aboriginal site of 'high significance' (Burke 1993:Table 17). On the Queensland Environmental Protection Agency (EPA) Site Index Form completed for site CC-067, Burke notes that 'this shell midden appears to be interspersed with a natural beach ridge. It was quite difficult to determine if the midden was real or natural, it seems to me that it is probably a mixture of both'.

Test excavations and augering were subsequently undertaken under the auspices of the Gooreng Gooreng Cultural Heritage Project in January 1995. In previous publications the site has been called 'Rodds Peninsula' (Lilley et al. 1996) and the 'Rodds Peninsula Site Complex' (Carter 1997) but was renamed the Mort Creek Site Complex (MCSC) to distinguish it from other major site complexes recorded on Rodds Peninsula (e.g. the Pancake Creek Site Complex; see Chapter 8). The site is registered on the EPA's Indigenous Sites Database as KE:A41 and Queensland Museum Scientific Collection Number S866.

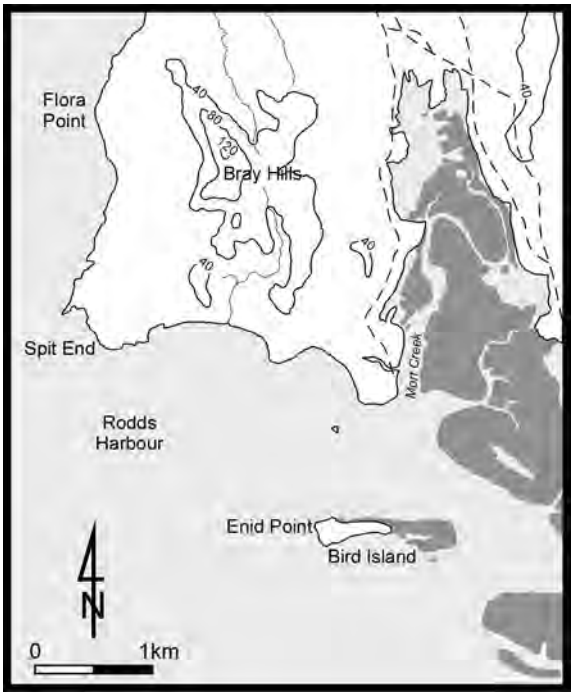

Figure 7.1 The Mort Creek catchment area. Dark grey shading indicates the general extent of mangrove, saltflats and claypans. Dashed lines denote 4WD tracks.

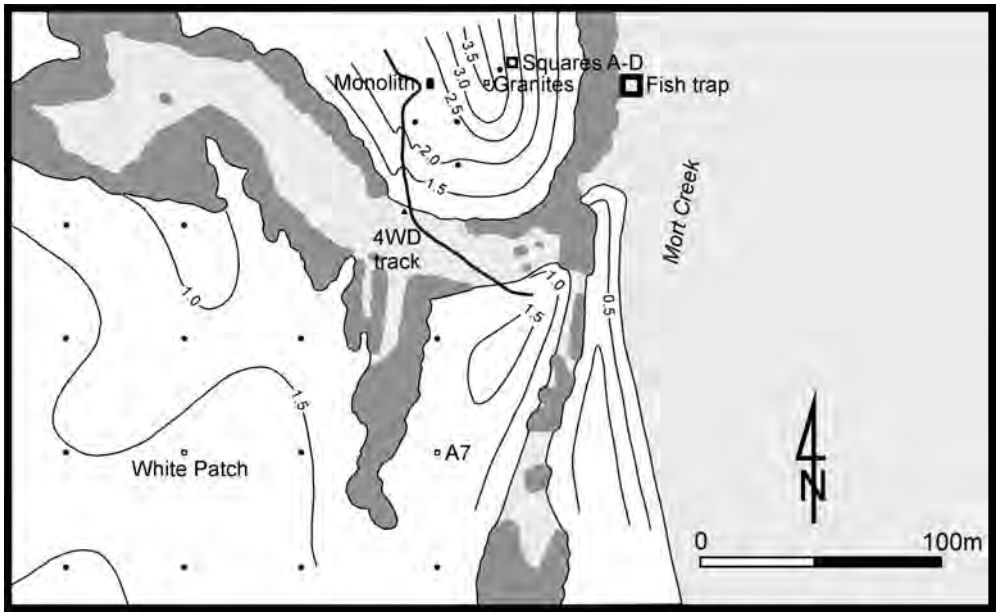

Figure 7.2 Topographic map of the Mort Creek Site Complex. Contours are in 0.5m intervals. Dark grey shading indicates the general extent of mangroves. Dots indicate auger test holes (not all shown).

In the initial field season, three 50cm × 50cm test pits were excavated to recover samples of cultural and natural marine shell deposits as part of an investigation of site formation processes in the area. In addition, a grid of 38 × 75mm auger holes were drilled across the site at 50m intervals to delineate the subsurface distribution of shell deposits. The first excavation was conducted in an area named 'White Patch' owing to the abundance of highly fragmented surface shell. The second excavation was undertaken beside auger hole number seven ('A7'), where a dense shell layer some 10–15cm thick was located approximately 20cm below ground surface in a sandy area with virtually no surface shell. The third excavation was placed in an area with abundant surface shell near 'The Granites' named because of microgranite boulders at this location (Fig. 7.2).

The White Patch excavations revealed a densely packed, highly fragmented shell deposit attributed to chenier development. It is characterised by a large range of species (>72 shell taxa), comprising juvenile shells and micro-molluscs and a general absence of charcoal, bone and stone artefacts. The Granites excavation revealed shell midden (>9 shell taxa) including stone artefacts and burnt fish bone overlying a chenier deposit (>62 shell taxa) resting on microgranite bedrock. The excavation at A7 revealed more complex sediments, suggesting the interfingering of cultural and natural shell deposits (>52 shell taxa). A possible shell artefact manufactured on the right valve of a *Antigona chemnitzii* was recovered at the base of the dense shell layer. Although the heavily scalloped edge is not typical of natural bivalve fracture patterns, detailed microscopy and chemical screening for use-wear and organic residues failed to confirm its cultural status (Culbert 1996). The augering demonstrated that there were substantial subsurface shell deposits over the entire area, including those parts where surface shell was largely absent.

Analysis (including studies of foraminifers) and radiocarbon dating of the excavated materials revealed a complex site formation history, with interfingering cultural and natural shell deposits in some areas of the site (Carter 1997; Carter et al. 1999; Lilley et al. 1999; Lilley et al. 1996). Probable cultural deposits at The Granites were dated to 2,335 cal BP (Wk-3941) – a relatively early date in the context of other sites on the Queensland coast (see Ulm et al. 1995). The resolution available for The Granites test excavation does not enable a high level of confidence to be placed in these findings. There are inconsistencies in the recorded elevations for the critical excavation units at the presumed contact point between cultural and natural deposits. XU11, the unit spanning this transition, was also disturbed by augering from the base of XU10, when it was assumed that the base of the deposit had been reached. Somewhere around XU11 or soon after, the excavation area was decreased from 50cm × 50cm to 25cm × 25cm and excavation was terminated at a depth of c.70cm below ground surface, some 20cm above the base of the shell deposit as determined by subsequent augering (see below for a discussion of problems in the chronology of the earlier excavations). The intra-specific size distribution of shells in XU11 of The Granites also supports the view that this unit comprises a mix of natural and cultural deposits (Carter 1997:85–6). The presence of stone artefacts and bone in both XU11 (the unit thought to be mixed midden and chenier deposit) and XU12 (the unit concluded to be solely chenier deposit) further indicates the presence of a mixed deposit (Carter n.d.:8), suggesting that the base of cultural deposits were not reached before the pit was reduced to a 25cm × 25cm sampling area.

Radiocarbon dates from the chenier deposits at White Patch and the base of The Granites indicate an overlap in the formation of natural and cultural shell deposits at the site, suggesting that Aboriginal occupation occurred in this area while the local landscape was in a significant state of flux. The aim of the further excavations at the site was to increase the sample of excavated material from The Granites area in a manner which ensured maximum resolution in discriminating between cultural and natural shell deposits, and enabled confident sampling of cultural material for dating. For further details on the results of earlier test excavations see Carter (n.d., 1997), Carter et al. (1999), Lilley et al. (1999) and Lilley et al. (1996).

Nearby sites include a probable stone-walled tidal fishtrap (KF:A12) at Richard's Point, c.7.5km to the north-northwest (Fig. 2.12). No significant cultural deposits are associated with this feature, although any deposits which may have occurred there are likely to have been disturbed by heavy mineral sandmining activities in this area in the 1970s. Although occasional stone artefacts and low density shell scatters have been encountered across the peninsula (see Chapter 2), the only other major site recorded is the Pancake Creek Site Complex, some 19km to the southeast (see Chapter 8; see also Burke 1993).

Figure 7.3 Chenier ridge at the Mort Creek Site Complex extending into Rodds Harbour. Facing southwest (Photograph: Ian Lilley).

Excavation methods

A single 1m^2 pit divided into four 50cm × 50cm separately excavated squares (Squares A-D) was excavated to bedrock between 28 October and 5 November 1998 (Figs 7.2, 7.4–7.5). The excavation grid was situated in an open, level area approximately 8–10m northeast of the original Granites excavation. Although the precise location of the earlier excavations was not established, Squares A-D were located on the same low, sandy ridge to maximise the recovery of cultural deposits based on the high density cultural materials encountered earlier in this area. Excavation proceeded in shallow, arbitrary excavation units averaging 3.1cm in depth and 10.6kg in weight. Excavation ceased at a maximum depth of 68.4cm below ground surface after microgranite bedrock had been exposed over the entire base of the excavation area (Fig. 7.4). A total of 81 XUs was removed, distributed as follows: Square A (20 XUs), Square B (22 XUs), Square C (19 XUs), Square D (20 XUs). A total of 881.7kg of sediment was excavated. Excavated sediments were gently dry-sieved through 3mm screens onto a plastic tarpaulin located 10m northeast of the excavation to prevent contamination of underlying sediments. Stone (n=35), bone (n=14), carapace (n=6), charcoal (n=6), shell (n=4) and pumice (n=3) specimens encountered *in situ* during excavation were plotted three-dimensionally. The excavation was backfilled with a layer of green plastic sample bags across the base, followed by c.60l of

Figure 7.4 General view of completed excavation, Squares A–D. Note continuous microgranite bedrock across the base of the excavation. Facing north.

Figure 7.5 General view of completed excavation, showing the section of Squares C–D. Note shell layer across the upper 20cm of the deposit. Facing east.

culturally-sterile white beach sands from the beach bordering Mort Creek and finally the sediments that had passed through the sieve (see Chapter 3 for a detailed discussion of the standard excavation methods employed at all sites).

Cultural deposit and stratigraphy

Excavation revealed approximately 65cm of sediments overlying microgranite bedrock (Fig. 7.5). Large quantities of shellfish remains, dominated by mud ark (*A. trapezia*), were recovered from a shell layer across the upper 20cm of the deposit. Remains of dugong (*Dugong dugon*) and turtle, probably loggerhead (*Caretta caretta*), were recovered towards the middle of the deposit immediately below the shell layer. Occasional shell and stone artefacts were recovered to bedrock, including several stone artefacts lying on the bedrock. Fish bone was recovered from every excavation unit. Two small areas of natural shell deposit were encountered at the base of the excavation in bedrock crevices clearly separated from the deposits containing cultural material. Bedrock was exposed over the entire base of the $1m^2$ excavation with natural shell deposits clearly distinguishable at the base of the profiles in the extreme southwest and northwest corners of the pit. The rate of site accumulation calculated using the methods outlined by Stein et al. (2003) indicate a relatively slow overall rate of site formation of 2.66cm/100 years.

The deposit can be divided into five major stratigraphic units (SUs) on the basis of sediment colour and texture (Table 7.1, Fig. 7.6). The reddish brown sediments which dominate the deposit appear to derive from weathering of the surrounding and underlying microgranite. Fragments of non-artefactual microgranite are abundant towards the base of the deposit and are assumed to derive from *in situ* weathering of the bedrock. Acidity (pH) values are neutral to slightly alkaline throughout (7.0–8.0).

The occurrence of chenier material at the base of the western extent of the excavation suggests that the current excavations may have encountered the margin of a chenier which is more concentrated in the ridge area of the original Granites excavation to the southwest. Although both occurrences of chenier material appear to be infilling natural depressions in the bedrock, they occur at different elevations in the present pit: in the southwest corner it is 55–60cm below ground surface while in the northwest corner it is 62–68cm. Chenier material was encountered in The Granites test excavation at a depth of c.43cm. Assuming that all of this material belongs to the same sedimentary unit, the difference in relative depth below ground surface in the occurrence of the chenier material between the two excavations areas can probably be accounted for by topographic variations in the underlying bedrock. The differences in elevation between chenier material in Squares A and B, however, suggest that there has been erosion of the chenier deposit in the area, with remnants retained in crevices in the bedrock (see below for a proposed chronology of chenier formation).

Radiocarbon dating and chronology

Twelve radiocarbon determinations were obtained for the deposits, including the seven dates obtained for the initial excavations. Three dates were obtained from A7, two from The Granites, two from White Patch and five from Squares A–D. Ten dates were obtained on *A. trapezia* samples, one on charcoal and one on mixed shell (Table 7.2). The charcoal date (Wk-7458) was paired with two associated *A. trapezia* samples (Wk-6987 and Wk-7836) to investigate local marine reservoir conditions (see Chapter 4). Calibration calculations presented in Table 7.2 employ a ΔR correction value of +12±58. On the basis of the x-ray diffraction analysis (XRD), two shell samples (Wk-3939a

Table 7.1 Stratigraphic Unit descriptions, Mort Creek Site Complex, Squares A–D.

SU	DESCRIPTION
I	Extends across the entire square with an average depth of 5cm and a maximum depth of 10cm below ground surface. The unit comprises angular to subangular loosely consolidated surface sands which are brown (7.5YR-4/2) to very dark brown in colour (7.5YR-2.5/3). Occasional tufts of grass penetrate this surface layer with numerous small, fibrous roots. Cultural materials include occasional whole and fragmented mud ark shell. pH values are slightly alkaline (7.5).
II	Extends across the entire square with a maximum thickness of 40cm and a maximum depth of 42cm below the surface. It comprises a dense shell layer across its upper half surrounded by a more consolidated fine subrounded and poorly-sorted sandy matrix which is a dark reddish brown (5.0YR-3/2) in colour. The soils are very organic containing abundant shell materials, stone artefacts, complex root systems and fibrous rootlets as well as occasional large pieces of marine mammal and marine reptile bone. Shell and bone cultural material appear to be well-preserved. pH values are slightly alkaline to alkaline (7.5–8.0).
III	Extends across the entire square with a maximum thickness of 23cm and a maximum depth of 55cm below the surface, tapering in thickness towards the northwest corner of the excavation. The unit continues to bedrock in the eastern third of Square D. The sandy matrix has decreased to a loosely consolidated consistency in this layer, while the colour has changed slightly to a very dark grey (5.0YR-3/1) grading to dark reddish brown (5.0YR-3/2). The matrix is defined by generally less abundant quantities of degraded shell material and some small roots. This layer appears to slope towards the northwest section. pH values are slightly alkaline to alkaline (7.5–8.0).
IV	Extends across the entire square and contacts bedrock over most of this area with the exception of the eastern third of Square D where SUIII continues to bedrock and the small areas of SUV (see below). The unit has a maximum thickness of 27cm and a maximum depth of 75cm below the surface where it infills crevices in the bedrock. Distinctly different from the previous units, this layer is moist and well-consolidated. The matrix appears a dark reddish brown to black colour (5.0YR-3/2 to 5.0YR-2.5/1), and contains many coarse sediments. The layer also contains numerous fragments of degraded microgranite, probably derived from *in situ* weathering of the underlying bedrock. Occasional heavily weathered shell fragments and stone artefacts were noted, while the majority of the excavation has been exposed to bedrock at this depth. pH values for this SU remain slightly alkaline to alkaline (7.5–8.0).
V	Discrete thin layer of shell fragments and small whole shells of various taxa in a very dark grey (7.5YR-3/1) sandy matrix resting on bedrock encountered in the two extreme western corners in the excavation pit (southwest corner of Square A and northwest corner of Square B). The layer represents numerous species of shell and was identified in the field as chenier (i.e. natural marine shell deposited by water action). pH values remain alkaline (8.0).

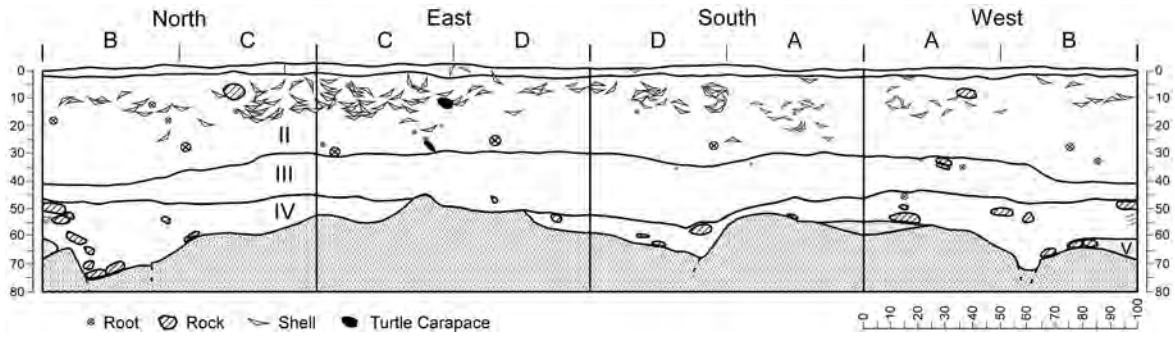

Figure 7.6 Stratigraphic section, Mort Creek Site Complex, Squares A–D.

and Wk-3939b) derived from 18.5–28.3cm below ground surface at The Granites were rejected as they contained recrystallised material.

It has been argued elsewhere that The Granites XU11C date of 3,065 cal BP (Wk-3940) related to the surface of a buried chenier ridge while The Granites XU11M determination of 2,335 cal BP (Wk-3941) dates a veneer of midden material lying directly on top of the chenier (Carter et al. 1999; Lilley et al. 1999). Although the dated shell specimens were excavated as part of a single unit, they were separated into cultural and natural specimens on the basis of colour staining and the colour and texture of the matrix adhering to the shell specimens (Lilley et al. 1996:39). The mixed status of XU11 is evident in the range of shellfish taxa recovered (n=17), including very small individuals and taxa such as *Bembicium auratum* and *Bendeva hanleyi* which are unlikely to be deliberately targetted for collection (Carter et al. 1999:93, 99–102). Like the shell from the White Patch chenier, it was argued that The Granites chenier was characterised by pink-tinged shell and clean yellow sand, whereas shell from the midden deposit was defined by a lack of pink colouration of the shell and by the fine, dark, organic sediment adhering to it (Lilley et al. 1999). The criteria employed for

separating cultural from natural shell specimens is called into question by results from Squares A–D, where unambiguously cultural shell and bone materials are stained a dark reddish brown (5.0YR-3/2) colour, probably associated with local sediment supply relating to weathering of the microgranite bedrock than natural versus cultural formation processes. A second set of problems in accepting the accuracy of the Wk-3940 determination is raised by the sample composition. Wk-3940 consisted of a 66.7g marine shell sample comprising 84 fragments of shell from 17 taxa. Oyster comprised 22.2g of the sample. Owing to the fact that not all 84 fragments in the sample were screened for recrystallisation the apparently large age difference between the samples in XU11 might be attributed to some components of the dated sample being recrystallised, rather than a significant time lapse between cessation of chenier formation and Aboriginal occupation of this area of the site. This caveat aside, the date is broadly consistent with indirect dates for chenier formation from Squares A–D (see below).

The two White Patch determinations (Wk-3942 and Wk-3943) date the chenier deposit southwest of The Granites, suggesting that it was forming while the lower Granites midden was being deposited on the surface of the chenier possibly formed centuries earlier. The dates obtained from A7 indicate formation of this deposit between c.2,400–2,800 cal BP. The apparent inversion of the date from XU9 (Wk-3938) may simply indicate rapid formation of the deposit as all three determinations overlap at the two sigma calibrated age-range. The calibrated age-ranges of the three dates from the shell layer in SUII of Squares A–D (Wk-7458, Wk-7836 and Wk-6987) overlap at one standard deviation indicating an extremely rapid accumulation of this unit. Thus the radiocarbon dates suggest an overlap in the formation of cultural and natural shell deposits in the study area. The termination date provided by Wk-7458, while not from the actual surface of the deposit, is from the middle of SUII indicating that this part of the site was probably abandoned not long after c.1,850 cal BP. The dates are thus in sequence overall, suggesting first occupation shortly before c.3,300 cal BP and abandonment after 1,900 years ago.

Two periods of chenier-building are dated at the site. The earliest episode ceases around 3,310–3,065 cal BP as defined by the contact point between cultural and natural deposits at The Granites (see caution above) and the basal dates for sediments overlying the chenier units in Squares A–D. A later episode of chenier formation to the south and west occurred between 2,353–2,059 cal BP, as evidenced by the White Patch deposits and a dated *in situ* chenier layer mid-way down the A7 profile. A lower chenier deposit identified in XU13–14 of A7 (Carter et al. 1999:94) may coincide with the earlier episode of chenier deposition mentioned above. These dates broadly coincide with major periods of chenier formation identified at 3,550 BP and 2,500 BP at Broad Sound, 250km to the north, where they have been linked to phases of decreased sediment supply (Cook and Mayo 1977; Cook and Polach 1973).

Stratigraphic integrity and disturbance

Several lines of evidence suggest that the deposit exhibits a high degree of stratigraphic integrity. The virtually continuous dense layer of *A. trapezia* valves across the four excavation squares c.10–20cm below ground surface caps the underlying sediments. The presence of bedrock at the base of the deposit demarcates the maximum extent of cultural materials. No burrows or voids were encountered during excavation. The radiocarbon date sequence shows a regular age-depth relationship. In addition, several conjoining *A. trapezia* valves were noted during excavation of SUII in both Squares A and D. There is also a predictable shell decay profile with highly weathered specimens recovered from the base of the deposit and relatively well-preserved specimens from the upper deposit. The major source of post-depositional disturbance appears to be the presence of numerous roots throughout the deposit. Abundant fibrous roots occur to a depth of c.40cm with a zone of larger roots between 20–30cm. Occasional larger roots occur to bedrock (Fig. 7.12).

Table 7.2 Radiocarbon dates from the Mort Creek Site Complex (see Appendix 1 for full radiometric data for each determination).

SQUARE	XU	DEPTH (cm)	LAB. NO.	SAMPLE	$\delta^{13}C$ (‰)	^{14}C AGE	CALIBRATED AGE/S
A7	4	18–20.2	Wk-5602	*A. trapezia*	−0.3±0.2	2880±50	2769(2688)2356
A7	6	22.6–26.7	Wk-3937	*A. trapezia*	0.1±0.2	2930±60	2845(2712)2446
A7	9	32.4–37	Wk-3938	*A. trapezia*	0.1±0.2	2720±60	2694(2353)2195
Granites	11M	45.5–52.1	Wk-3941	*A. trapezia*	−0.2±0.2	2680±60	2657(2335)2143
Granites	11C	45.5–52.1	Wk-3940	mixed shell[a]	0.7±0.2	3260±70	3320(3065)2823
WP	4	12.8–18.4	Wk-3942	*A. trapezia*	0.6±0.2	2440±80	2314(2059)1826
WP	10	37.6–44.8	Wk-3943	*A. trapezia*	−0.5±0.2	2570±60	2387(2269)2002
C	6	11.3–15.8	Wk-7458	charcoal	−26.5±0.2	1970±80	2057(1875)1633
C	6	11.3–15.8	Wk-7836	*A. trapezia*	−1.4±0.2	2320±50	2108(1915)1730
C	7	15.8–18.1	Wk-6987	*A. trapezia*	−1.5±0.2	2260±50	2026(1855)1682
C	18	53.6–56.4	Wk-6988	*A. trapezia*	−1.1±0.2	3380±90	3462(3235)2928
B	19–20	52.8–59.8	Wk-6986	*A. trapezia*	−1.6±0.2	3430±140	3633(3310)2870

a Mixed shell consisting of *Saccostrea* sp., *Polynices* sp., *Nerita chamaeleon, Placamen calophyllum, Fragum hemicardium, Gafrarium australe, Cymatium* sp., *Corbula* sp., *Antigona chemnitzii, Trisidos tortuosa, Tapes dorsatus, Meropesta* sp., *Pinctada* sp., *Trichomya hirsutus, Bembicium auratum, Calthalotia arruensis* and *A. trapezia.*

Table 7.3 Identified *A. trapezia* conjoin sets, Mort Creek Site Complex, Square C.

	XU					
CONJOIN SET	L	R	MIN. SEPARATION (cm)	MAX. SEPARATION (cm)	MID-POINT (cm)	± (cm)
Set 1	5	5	0	3.02	1.51	1.51
Set 2	2	3	0	5.58	2.79	2.79
Set 3	6	6	0	4.48	2.24	2.24
Set 4	6	6	0	4.48	2.24	2.24
Set 5	3	5	2.74	6.62	4.68	1.94
Set 6	4	4	0	2.74	1.37	1.37
Set 7	3	6	3.02	11.10	7.06	4.04
Set 8	6	6	0	4.48	2.24	2.24
Set 9	6	6	0	4.48	2.24	2.24
Set 10	4	3	0	3.60	1.80	1.80

Conjoin analysis of the *A. trapezia* assemblage shows that at least the shell layer toward the top of the deposit has excellent integrity. Out of a total dataset of 595 measured intact and broken valves, 470 were discarded from consideration in the conjoin analysis owing to an absence of hinge length or valve length and width, indicating the presence of valve damage (especially marginal damage). This left 125 relatively intact valves for consideration in the conjoin analysis, using the methods described in Chapter 5. A total minimum number of 10 *A. trapezia* conjoins was identified from Square C. Most pairs (n=7) were separated by 5cm or less and nine were separated by 10cm or less. Only one conjoin was separated by over 10cm (Fig. 7.7, Table 7.3). The shell lens therefore appears to exhibit a high degree of stratigraphic integrity, especially when it is considered that the maximum separation measurements of conjoins tends to overestimate the actual separation distance between valves in many instances (see Chapter 5). Although the distribution of identified conjoins largely reflects the vertical distribution of *A. trapezia* in the deposit, the 10 bivalve conjoin sets identified between 0–16cm below ground surface support the impression gained from the radiocarbon chronology that the shell layer accumulated during episode(s) of rapid deposition.

The *A. trapezia* assemblage is generally in poor condition, with a high ratio of broken to intact valves (11:1) and high rates of fragmentation, suggesting that the shells have been exposed to sustained heating after initial discard (see Chapter 5) and/or mechanical damage from treadage. *A. trapezia* fragmentation rates are relatively high throughout the sequence, with an average of 129.3 NISP/100g (compare, for example, with the average for the Seven Mile Creek Mound of 24.5

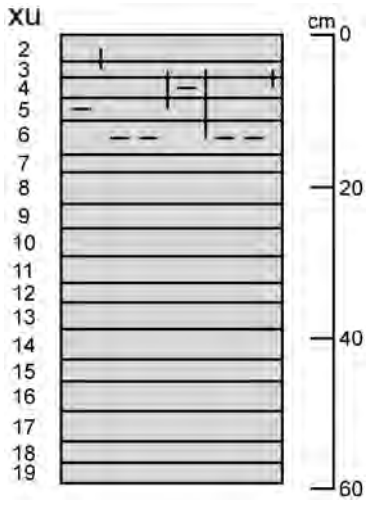

Figure 7.7 Distribution of identified *A. trapezia* valve-pairs (n=10), Mort Creek Site Complex, Square C. Line termination points indicate the vertical mid-points of the excavation units from which conjoining valves were located. Short horizontal lines indicate valve-pairs identified within excavation units. Not to scale on the horizontal axis. See Chapter 5 for details of methods.

NISP/100g) with peaks of 428.6 and 193.9 at the base and top of the deposit respectively. The high rates of fragmentation at the base of the deposit are attributed to an expected decay profile, while those at the top may be related to trampling. Zones of relatively low fragmentation are associated with the centre of the shell layer of SUII, where the matrix seems to have protected valves from extreme mechanical and chemical destruction.

Laboratory methods

Owing to the large quantity of excavated materials, detailed analysis of only a single square has been completed to date (Square C). Field observations and preliminary processing of the other three squares indicate a broad homogeneity in the contents of the excavated material. Results of the analysis of Square C are presented below, with reference to finds in other squares where relevant. Preliminary sorting of sieve residues from Squares C and D was conducted prior to wet sieving to remove marine fish vertebral components for DNA analysis and to prepare samples for radiocarbon dating (see Chapter 3 for a detailed discussion of the standard laboratory methods employed at all sites). Further summary results are available in Appendix 4.

Cultural materials

Invertebrate remains

Ten taxa of shellfish weighing 8,748.8g were identified in the Square C assemblage, consisting of four marine bivalves, two marine gastropods and four terrestrial gastropods (Table 7.4). The shell deposit is dominated by mud ark (*A. trapezia*) comprising 96.1% of the shell assemblage by weight (Fig. 7.8), followed by rock oyster (*Saccostrea glomerata*) (3.1%) (Fig. 7.9). The remaining eight taxa are relatively rare in the deposit, each contributing less than 1% of the shell assemblage by weight (Fig. 7.10). The assemblage exhibits relatively low diversity with a calculated Shannon-Weaver Function (H') of 0.272 and Simpson's Index of Diversity (1–D) of 0.119. Virtually all of the shell was recovered from the shell layer located across the top 20cm of the deposit, with occasional *A. trapezia* encountered to bedrock.

A similar range of taxa was recovered in the upper, unequivocally cultural, units of the nearby The Granites excavation. Carter (1997:89–90) found that *A. trapezia* comprised 85% of total MNI for The Granites excavation.

There is no significant change in the mean size of *A. trapezia* throughout the deposit as measured by five attributes (length, height, width, weight and hinge length) (e.g. length: χ^2=0.8055, df=6, p≤0.05) (Table 7.5). The mean length of *A. trapezia* does not fall below 38.4mm in any excavation unit which contains intact or broken valves, with a combined weighted mean calculated on 67 valves of 42.7±2 and a terminal mean of 43.4±7mm for XU2 (XU1 was the thin surface covering of turf).

Table 7.4 Presence/absence of shellfish identified in the Mort Creek Site Complex, Square C.

FAMILY	SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	TOTAL (g)
									MARINE BIVALVIA												
Arcidae	*Anadara trapezia*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		8408.9132
Mytilidae	*Trichomya hirsutus*						X	X	X											X	0.7151
Ostreidae	*Saccostrea glomerata*	X	X	X	X	X	X	X	X	X		X	X			X				X	275.5522
Pteriidae	*Pinctada albina sugillata*						X														0.3129
									MARINE GASTROPODA												
Batillariidae	*Pyrazus ebininus*					X	X	X	X												56.2353
Neritidae	*Nerita balteata*							X	X	X		X	X								4.6073
									TERRESTRIAL GASTROPODA												
Camaenidae	*Figuladra* sp.		X	X	X	X	X	X	X												2.1178
Camaenidae	*Trachiopsis mucosa*		X											X	X						0.1502
Pupillidae	*Pupoides pacificus*	X	X	X				X													0.1476
Subulinidae	*Eremopeas tuckeri*		X	X																	0.0429

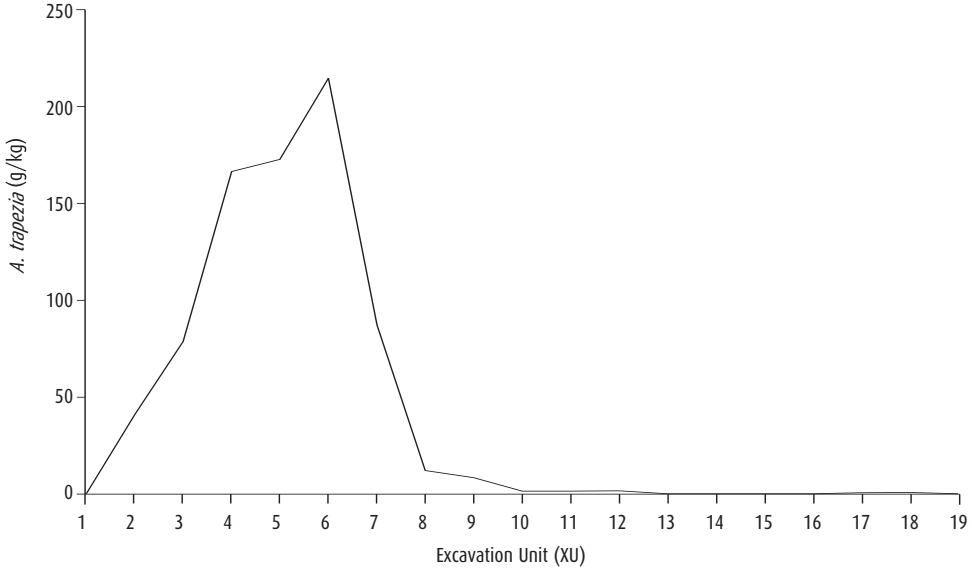

Figure 7.8 Abundance of mud ark (*A. trapezia*).

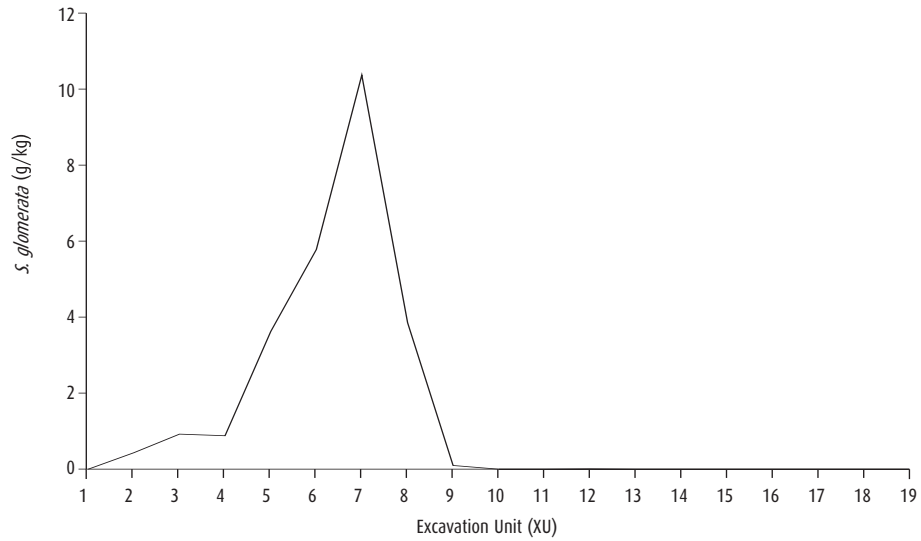

Figure 7.9 Abundance of oyster (*S. glomerata*).

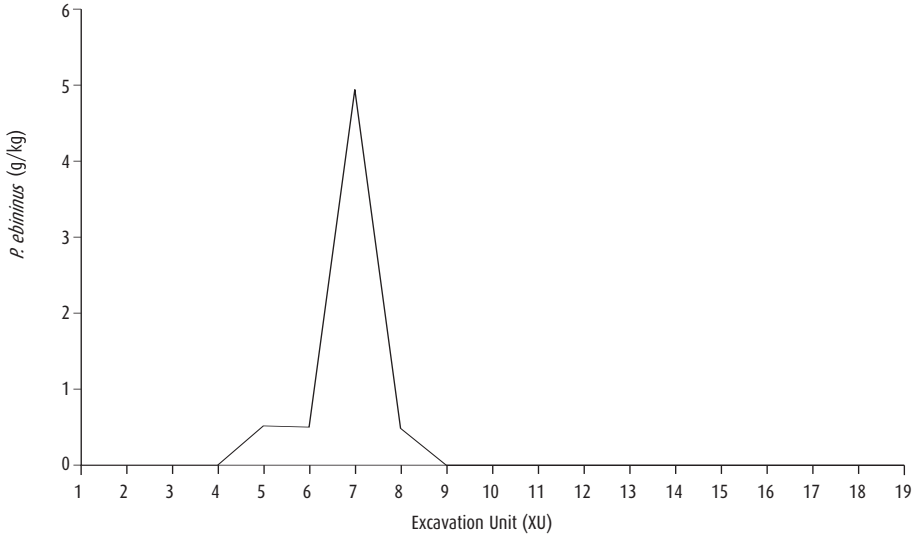

Figure 7.10 Abundance of whelk (*P. ebininus*).

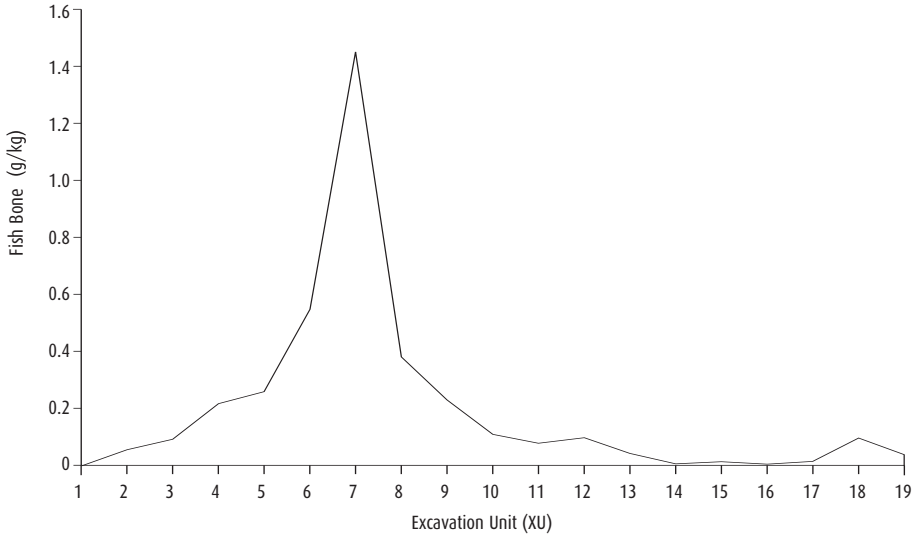

Figure 7.11 Abundance of fish bone.

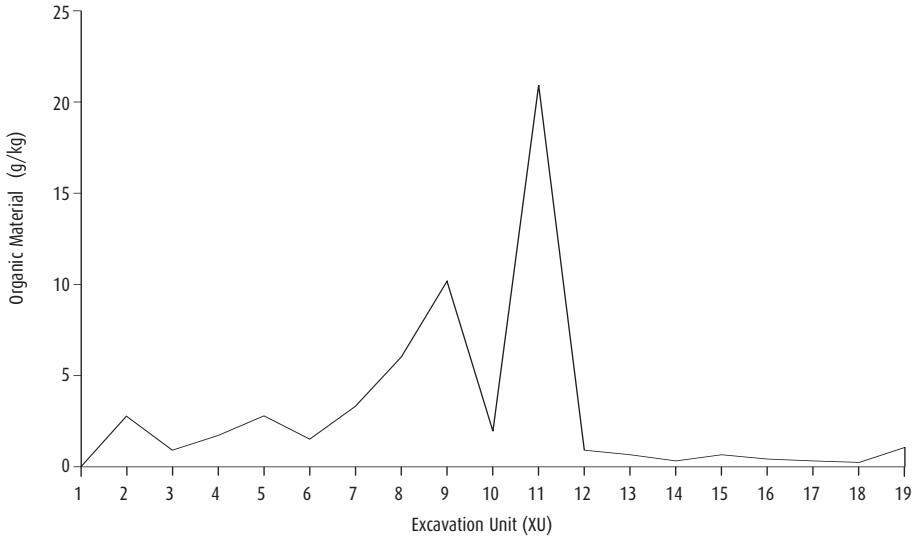

Figure 7.12 Abundance of organic material.

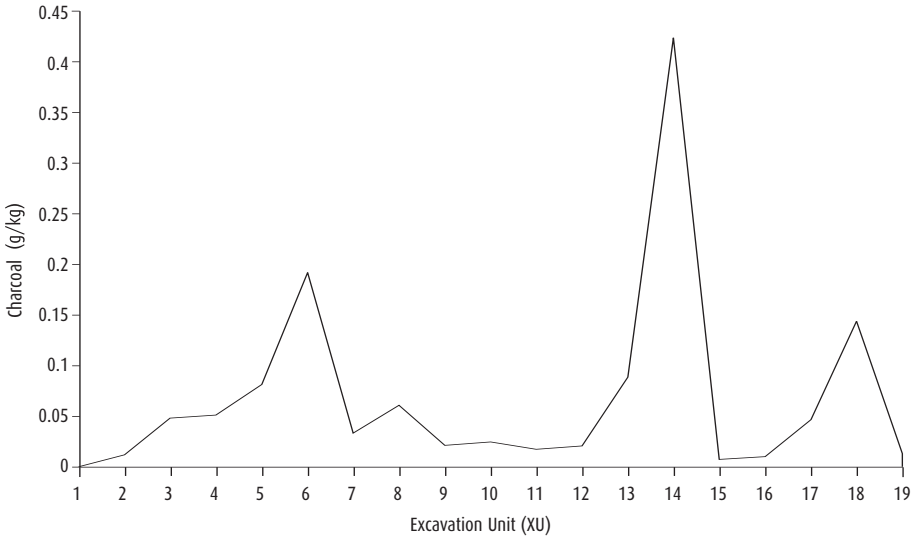

Figure 7.13 Abundance of charcoal.

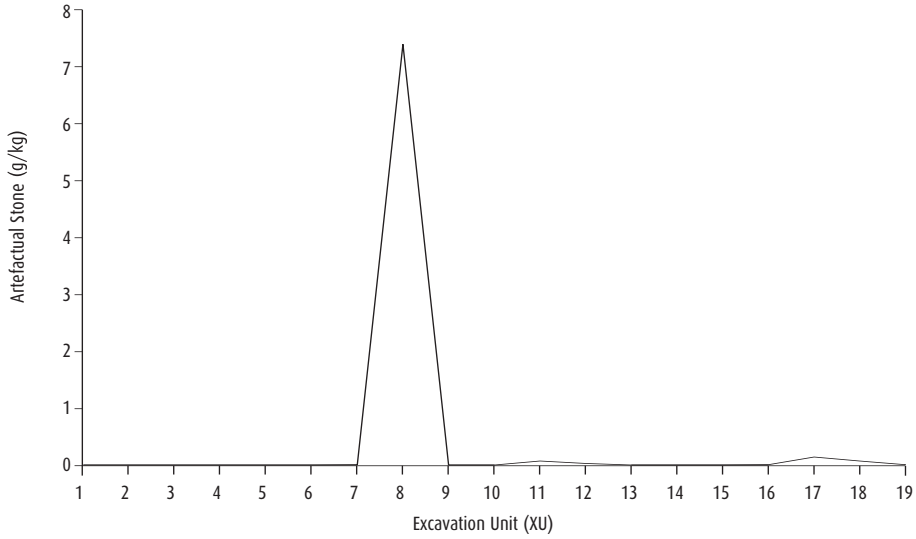

Figure 7.14 Abundance of artefactual stone.

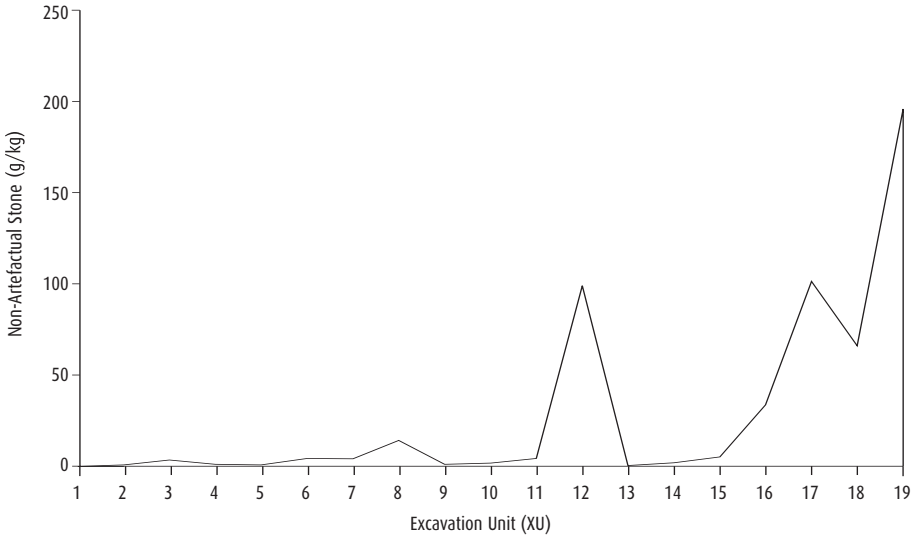

Figure 7.15 Abundance of non-artefactual stone.

Table 7.5 Metrical data for intact and broken (with umbo) *A. trapezia* valves from the Mort Creek Site Complex, Square C.

	MEAN LENGTH			MEAN HEIGHT			MEAN WIDTH			MEAN WEIGHT			MEAN HINGE		
XU	n	mm	±	n	mm	±	n	mm	±	n	g	±	n	mm	±
2	9	43.4	7.0	17	36.0	4.3	33	14.2	1.7	8	13.8	5.3	21	27.3	3.5
3	13	42.1	4.4	21	37.2	4.3	52	14.9	2.1	12	13.0	3.6	39	28.7	2.8
4	11	43.6	3.6	21	37.7	3.6	108	15.3	2.3	8	13.2	4.0	68	28.6	2.8
5	3	45.6	6.4	1	41.0	6.0	114	14.8	2.2	3	18.4	6.3	60	29.0	3.4
6	19	45.2	3.8	44	38.2	3.4	195	15.3	1.9	13	15.7	3.6	141	28.4	2.4
7	8	43.6	6.5	15	38.6	4.7	46	14.8	1.5	3	15.3	2.8	32	29.0	2.5
8	4	38.4	5.8	5	33.1	2.0	19	14.1	2.2	3	7.1	1.0	13	26.8	2.8
9	0	0	0	0	0	0	4	12.5	1.9	0	0	0	2	21.5	0.7
10	0	0	0	0	0	0	1	10.0	0	0	0	0	1	19.0	0
11	0	0	0	0	0	0	1	12.2	0	0	0	0	1	23.0	0
12	0	0	0	0	0	0	1	15.1	0	0	0	0	0	0	0
Total	67	42.7	2.0	134	35.9	1.3	574	14.5	0.7	50	9.0	0.8	378	23.6	0.6

Vertebrate remains

Fish bone is present throughout the cultural deposit, consisting of 1,635 pieces of bone totalling 38.4g and a NISP of 34 (Table 7.6, Fig. 7.11). A total MNI of 21 was calculated by summing the MNI for each excavation unit. The weight of bone identified to taxon was 4g, giving an identification rate of 10.5% (Table 7.6). Identified taxa in descending order of abundance include Sparidae, flathead (Platycephalidae), whiting (Sillaginidae) and catfish (Ariidae) (Table 7.7). Size-classing showed that 71% of all vertebrae have a centrum diameter of 3mm or less. These represent very small fin fish. Some larger fish are represented by single vertebrae recovered from XU5 and XU9. Three Sparidae otoliths from XU7 range in size from 12.4–21.5mm which represent very large fish. Comparative Sparidae otoliths from bream (*Acathopagrus australis*) with total lengths of 305mm and 365mm had otoliths measuring 9.8mm and 11.1mm in length respectively. In addition, a Platycephalidae dentary fragment from XU7 measured 6.9mm at the symphysis, much larger than a comparative Platycephalidae dentary with a symphysis length of 4.3mm for a 418mm fish (see Vale 2002, 2004 for further details). There is a discordance between the presence of at least several large individual fish represented by cranial elements (dentary and otoliths) and the very few vertebrae recovered above 3mm in centrum diameter. This pattern may relate to differential representation of skeletal elements caused by butchering practices on large fish, with post-cranial elements discarded elsewhere. Although fish bone occurs in every unit, it is most abundant in units where shell is also abundant (compare Figs 7.8 and 7.11).

Of the 16 vertebral samples subject to DNA analysis, only one returned a positive fish-like polymerase chain reaction (PCR) product, although this extract did not produce a product when sequenced (Hlinka et al. 2002). Taphonomic factors are thought to be responsible for the low amplification success rate. In particular, microscopic examination revealed that all samples had been penetrated by plant roots and showed signs of discolouration consistent with burning (see Hlinka et al. 2002 for further details).

Sixty-eight pieces of bone weighing 26.2g could not be assigned to a fish skeletal element. The small size of these specimens and the lack of diagnostic attributes generally prevented identification to taxon. However, positive identification of bone elements at a similar depth towards the base of SUII in adjacent squares as dugong (*D. dugon*) and turtle, probably loggerhead (*C. caretta*), suggest that many of the unidentified small bone fragments in Square C derive from these taxa. Dugong remains were recovered from Squares A–C in association with the lower half of the shell layer in SUII between 13.6–21.3cm below ground surface. Although the turtle carapace fragments recovered from between 24.5–35.2cm in Squares B and D are associated with occasional *A. trapezia* valves, they are clearly located below the major shell layer.

Table 7.6 Fish bone abundance, Mort Creek Site Complex, Square C.

XU	NUMBER SPECIMENS	TOTAL WEIGHT (g)	NISP	WEIGHT NISP (g)	MNI	% IDENTIFIED BY WEIGHT
1	0	0	0	0	0	0
2	36	1.0086	0	0	0	0
3	64	0.9123	0	0	0	0
4	97	2.1781	2	0.1433	1	6.93
5	90	2.3407	5	0.2710	4	11.44
6	272	7.0749	7	0.1520	2	2.35
7	313	10.7277	7	2.6287	5	24.45
8	332	6.7944	8	0.1633	5	2.76
9	82	1.9631	1	0.3738	1	20.65
10	74	1.1594	0	0	0	0
11	73	0.9109	2	0.0508	1	8.79
12	69	0.8443	0	0	0	0
13	28	0.4571	1	0.0245	1	7.32
14	8	0.0957	0	0	0	0
15	13	0.1390	0	0	0	0
16	5	0.0587	0	0	0	0
17	18	0.2461	0	0	0	0
18	49	1.1300	1	0.2353	1	36.13
19	12	0.3115	0	0	0	0
Total	1635	38.3525	34	4.0427	21	10.50

Stone artefacts

Stone artefacts are distributed throughout the cultural deposit between XU7–19 (Fig. 7.14). A total of 13 stone artefacts weighing 135.7g was identified in Square C (Table 7.8). Two of these items were plotted *in situ* during excavation with the rest recovered from the sieve residue. Virtually the entire assemblage is manufactured on quartz (n=10) with the remainder microgranite (n=3). The microgranite artefacts include a hammerstone exhibiting impact-pitting and flaked pieces. All raw materials are available in the immediate vicinity of the site or in the adjacent Bray Hills. Most artefacts are extremely small, with an average maximum dimension of 15.3mm and average weight of 10.4g. Two of the largest artefacts recovered from the excavation, a quartz core and flaked piece from Square B, were located immediately above bedrock

Table 7.7 Fish bone taxonomic representation, Mort Creek Site Complex, Square C.

TAXON	NISP	MNI	WEIGHT (g)
Sparidae	19	10	2.95
Platycephalidae	8	6	0.98
Sillaginidae	4	4	0.09
Ariidae	2	1	0.02
Total	33	21	4.04

Table 7.8 Stone artefacts from the Mort Creek Site Complex, Square C.

RAW MATERIAL	ARTEFACT TYPE	NUMBER	WEIGHT (g)	XUs
Quartz	Flaked Piece	10	2.2	7–8, 11–12, 16–19
Microgranite	Flaked Piece	2	1.9	17–18
Microgranite	Hammerstone	1	131.7	8
Total	–	13	135.7	–

Francis (1999) analysed a single small (6.3g) quartzite flaked piece (FS60) from Square B, XU21, for residues using incident-light microscopy (see Loy 1994 for a discussion of techniques). In addition to rootlets, sand grains and spores attributed to post-depositional processes, Francis (1999) described a concentration of white crystalline raphides along the edge of the tool suggesting that it was used to scrap or cut plant tissue containing raphides.

Other remains

A range of other materials was recovered from the site. Small nodules of red ochre totalling 1.5g were recovered from XU12–15. Small pieces of pumice totalling 32.2g were recovered from the bottom half of the deposit (XU13, 20–31). Charcoal, totalling 15.8g, is represented in very small quantities throughout the deposit (Fig. 7.13). The presence of charcoal in culturally-sterile sediments below the shell deposit suggests that some of the other small quantities of charcoal represented in the assemblage may derive from natural rather than cultural deposition.

Discussion

The Mort Creek Site Complex accumulated over a period of about 1,400 years between c.3,300–1,900 cal BP. The first 1,000 years of site use is characterised by intermittent low intensity occupation with subsistence focussing on fin fish with occasional hunting of dugong and turtle and incidental shellfishing. Results support Carter's (1997:107) conclusion that ephemeral occupation of the area, including chenier ridges, occurred while the local landscape was in a significant state of flux. Around 2,000 BP the intensity of use of the site dramatically increased, with a layer of shell material dominated by *A. trapezia* and fish remains deposited over a large area between 1,800 and 2,000 BP. Current evidence points to the site being little used since that time.

Like the nearby Seven Mile Creek Mound, reduction of use or abandonment of the Mort Creek Site Complex does not appear to be linked to changes in resource availability, caused by either environmental change or overexploitation. The range of estuarine taxa represented in the assemblage and the lack of change in *A. trapezia* size throughout the sequence suggest the presence of a stable estuary that was not suffering from overexploitation. These data therefore lend support to the idea that site abandonment was linked to alterations in regional settlement strategies that were not exclusively based on coastal resources.

The Mort Creek Site Complex is one of the most scientifically significant sites investigated on the southern Curtis Coast during the course of this study. In addition to its antiquity, it is the only site which has evidence for the procurement of large marine animals such as dugong and turtle. Rodds Harbour currently supports the largest dugong population along the Curtis Coast (QDEH 1994:66), with an estimated minimum population of 300±95 (Marsh and Saalfeld 1989). Minnegal (1982:21) notes that dugong are the largest animals hunted by coastal Aboriginal populations in northern Australia, with adult weights up to 420kg (Heinsohn 1991). Despite several detailed eighteenth and nineteenth century ethnohistoric accounts of dugong and turtle hunting in southeast Queensland (e.g. Backhouse 1843; Colliver and Woolston 1978; Fairholme 1856; Flinders 1814; MacGillivray 1852; Petrie 1904:24–5, 65–9, 82–3; Watkins 1891), archaeological remains are relatively rare and very recent. At the site of St Helena Island in Moreton Bay, dugong bone was recovered from the top 15cm of the deposit, which Alfredson (1984:73) dates to the mid-to-late nineteenth century. On Moreton Island, several bone fragments have been tentatively identified as dugong at the Little Sandhills site, although the radiocarbon date indicates a probable post-contact chronology (Robins 1983, 1984). Similarly at Wallen Wallen Creek on Stradbroke Island, dugong remains were identified in the late Holocene deposits, but the chronology of the remains is unclear from the reported data (Neal and Stock 1986). Walters (1979:47) identified nine specimens of dugong bone from Trench B at Toulkerrie on Moreton Island, although no provenance details are available and the entire analysed assemblage appears to date from the last 400 years (see Ulm 2002a:86–7). The secure dating of dugong remains to before 2,000 BP provides some of the earliest, if not the earliest, evidence for dugong procurement activities in southeast Queensland.

Data from the Mort Creek Site Complex provide evidence for a well-developed marine economy including fin fish, shellfish, dugong and turtle before 2,000 BP and possibly up to 3,300

BP. A similar antiquity for these activities is indicated by other recent research (see Ulm 2002a for an overview) and further undermines the model proposed by Walters (1986, 1989, 1992a, 1992b) that marine fishing was only incorporated as a regular feature of subsistence-settlement systems in southeast Queensland in the last 2,000 years. For the Waddy Point Rockshelter 1 on Fraser Island, McNiven et al. (2002:15) has recently demonstrated that fish bone is only consistently represented in the faunal assemblage after shell densities exceed 9–10g/kg of deposit. He (1991a:21; McNiven et al. 2002:15) has suggested that the survival of fish bone in southeast Queensland deposits may be correlated with the occurrence of shell, with the presence of shellfish remains providing a protective matrix and altering the chemical properties of the sedimentary matrix towards conditions conducive to fish bone preservation. At the Mort Creek Site Complex fish bone is represented throughout the deposit, including excavation units with shell densities well below 1g/kg of deposit. However, there is generally a positive relationship between the abundance of fish bone and shellfish remains, particularly in the upper deposit. As McNiven et al. (2002:15) warned, whether this indicates patterns of subsistence or patterns of bone survivorship remains to be determined, although the presence of fish bone in the lower deposits of the Mort Creek Site Complex indicates that fish bone may survive under certain conditions without an accompanying shell matrix.

Results from the Mort Creek Site Complex indicate that care must be taken in excavation, analysis and interpretation of the archaeology of the area owing to the co-occurrence of cultural and natural shell deposits. Interpretations would greatly benefit from detailed geomorphological investigation of the area. Further dating of terminal deposits would be useful to confirm the time of abandonment. Successful dating of chenier material encountered along the basal western margin of Squares A–D would confirm the antiquity of this unit and help to better define periods of chenier formation in the area. As Carter (1997) noted, further application of foraminifers analysis to all deposits would also benefit the discrimination of cultural from natural deposits. Ultimately, excavation of a larger area across the ridge close to The Granites and Squares A–D would help resolve stratigraphic relationships between natural and cultural deposits and identify further variability in the structure of the site.

Summary

The Mort Creek Site Complex was occupied for at least 1,400 years between c.3,300–1,900 cal BP. An initial period of low intensity occupation was followed by a brief more intensive use of the site around 2,000 years ago. The site appears to have been abandoned soon after this period of rapid deposition. Like the Seven Mile Creek Mound, the evidence from the Mort Creek Site Complex suggests activities and site functions that have no obvious parallels with other sites investigated on the southern Curtis Coast dating to the last 1,500 years. The occupation and subsequent abandonment of these two sites appears to be associated with systems of land-use that changed in the last 2,000 years. These patterns will be elucidated through the description of investigations undertaken at other sites.