Historical continuities in Aboriginal land-use at Bustard Bay, Queensland: results of use-wear and residue analysis of Aboriginal glass artefacts

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Glass artefacts are reported from the surface of two long-term Aboriginal sites at Bustard Bay on the southern Curtis Coast. Comparative historical bottle reference collections and contexts date the assemblages to the late nineteenth/early twentieth centuries. Use-wear and residue studies show that several of the glass artefacts were used in woodworking and plant processing activities. The artefacts not only document the presence of Aboriginal people in this area at a time when the historical record is silent, but demonstrate continuing Aboriginal use of known places on the landscape and continuing application of food-processing technologies into the historical period using artefacts manufactured on European raw materials.

INTRODUCTION

Studies across southeast Queensland have documented European artefacts (e.g. clay pipes, metal, bottles) and flaked or otherwise utilised European materials (e.g. glass, telegraph insulators, ceramic) at Aboriginal cultural places. This range of what Harrison (2005:19) has termed 'transformed material culture' is crucial to the study of early cross-cultural encounter; however, the implications of these finds for understanding the shared southeast Queensland contact landscape have not been considered, except in very general terms (e.g. McNiven 2006; Ulm and Hall 1996). Indeed, items of post-contact Aboriginal material culture recovered at archaeological sites in the region are often only briefly noted by investigators or simply used as chronological markers to denote the onset of European settlement.

McNiven (1998) and Courtney and McNiven (1998) reported clay pipes of English or Scottish manufacture and flaked bottle glass artefacts dating to the mid-to-late nineteenth century on the surface of shell middens at Corroboree Beach on the east coast of Fraser Island. They suggested that the pipes may have served a ceremonial function along traditional lines of intergroup gatherings (Courtney and McNiven 1998:51). McNiven (1994, 1998) also noted 10 sites on the east coast of Fraser Island containing bottle glass. Hall (1984:68,76) reported a clay pipe bowl, castor oil bottle fragment, strap iron, rubber fragment and a copper nail dating to the nineteenth century from surface and near-surface deposits at Toulkerrie on the southwestern end of Moreton Island. Drawing on work by Robins (1983), Hall (1984:68) suggested that these artefacts may be evidence of continuing use of the area by Aboriginal people living on the adjacent Stradbroke Island, well after European settlement of the region. A metal object recovered from the Teewah Beach Site 116 at Cooloola associated with shell midden and stone artefact material was interpreted by McNiven (1990) as evidence for post-contact Aboriginal use of the site. Further north, flaked bottle glass has been reported at Contact Cave in Cania Gorge (Westcott et al. 1999:22). A number of other sites have modern radiocarbon dates which may indicate post-contact occupation (see Lilley and Hall 1988; McNiven 2006; Neal 1984; Ulm and Hall 1996; Ulm and Reid 2000).

Although increasing numbers of studies have been conducted in the field of contact archaeology in Australia, few studies have undertaken detailed analyses of post-contact material culture assemblages (but see Harrison 2000a; Paterson 2008; Smith 2001). Most of these studies have focused on glass artefact technology, production and authentication criteria (e.g. Allen and Jones 1980; Cooper and Bowdler 1998; Harrison 2000a; Niemoeller and Guse 1999) rather than, as Gibbs and Harrison (2008) have argued, consideration of the wider social context of glass artefact production. While this is undoubtedly true, even more limited attention has been given to determining the specific uses of glass artefacts manufactured by Aboriginal people.

It is often assumed that as glass was essentially a replacement for stone as a raw material in the manufacture of tools they had a similar functional range, as documented in ethnographic accounts (e.g. Gould 1968) and suggested by the presence of standardised artefact forms manufactured on both stone and glass, such as points, tula adzes, burren adzes and scrapers (e.g. Veth and O'Connor 2005:7). However, Harrison (2003, 2005) has argued that many such highly worked artefacts may have served primarily symbolic rather than economic functions as they have limited evidence of use (cf. Akerman 2008). As both Veth and O'Connor (2005) and Harrison (2005) have noted, assumptions about the use of glass artefacts by Aboriginal people and their ability to represent continuity in site function must be tested using use-wear and residue studies.

Use-wear and residue studies have been increasingly applied to stone artefact assemblages in Australia (e.g. Atchison and Fullagar 1998; Cosgrove et al. 2007; Fullagar and Jones 2004; Robertson 2002); however, they have rarely been applied to contact period materials. Walshe and Loy (2004) briefly reported a residue analysis of a single telegraph insulator flake tool from Kangaroo Island which they interpreted as having being used for woodworking. Wolski and Loy (1999) applied residue analysis to an assemblage of glass from three sites in western Victoria to show a range of functions focused on woodworking and plant processing. At Cossack in Western Australia, Wilson (2005) used use-wear and residue studies in an exploration of glass artefact assemblages. In the Northern Territory, Bolton (1999) showed that glass artefacts from Illamurta Springs had been used for woodworking. Significantly, Wolski and Loy (1999) and Harrison (2003) have demonstrated that unretouched glass was frequently used as tools, emphasising the need for study of all elements of glass assemblages associated with Aboriginal places rather than just the retouched component.

During archaeological investigations on the southern Curtis Coast glass artefacts were recovered from the surface of two long-term Aboriginal occupation sites – the Ironbark Site Complex and Tom's Creek Site Complex (Figure 1) – and subjected to use-wear and residue analysis. Results are described and their implications for understanding Aboriginal land-use histories well into the period of European occupation considered. These results expand the preliminary use-wear and residue study of the Ironbark Site Complex glass assemblage briefly reported by Ulm et al. (1999).

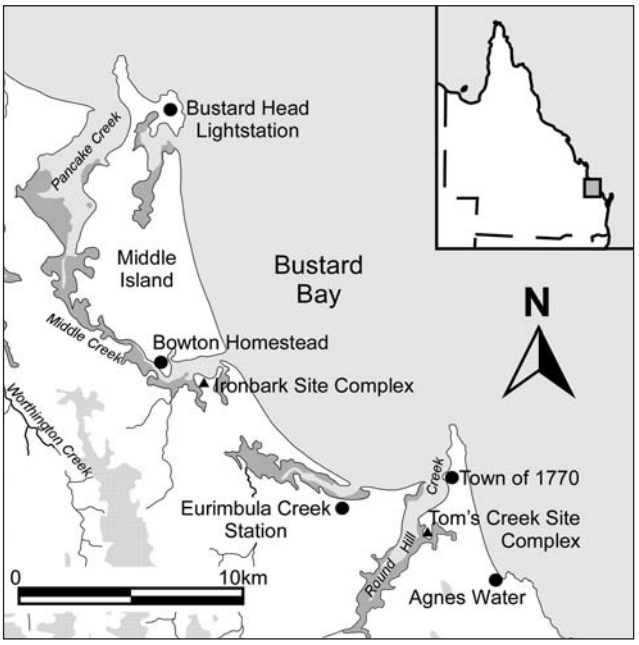

Figure 1: Southern Curtis Coast, showing places mentioned in the text.

HISTORICAL CONTEXT

The early historical record for the Bustard Bay area is sparse, with considerable conflict; both among documentary sources and between documentary and Aboriginal oral histories (see Clarkson et al. 1995 for a detailed discussion). The very few documentary sources which relate specifically to Bustard Bay begin with Joseph Banks' observation on 23 May 1770 of two Aboriginal men walking along the beach to the south of Bustard Bay (Beaglehole 1963:65). The following day, a party from the *Endeavour* went ashore at Bustard Bay to inspect the country, noting a recently-vacated occupation site. Both Cook and Banks made detailed diary entries of the visit suggesting small (still burning) fires, artefacts and food refuse consistent with a temporarily (and very recently) vacated camp site (Banks in Beaglehole 1963:67; Cook in Beaglehole 1968:256). Setting sail and journeying north the next day Banks noted fires at some distance 'tho not many' (Banks in Beaglehole 1963). These observations are not surprising given the rich and long-term Aboriginal archaeological record documented throughout the region (see Ulm 2006).

Subsequent sources (mainly from ships and exploratory vessels) make passing references to sightings of Aboriginal people, material culture or smoke from campfires in the general region (e.g. Flinders 1814; Oxley 1825). In August 1802, Flinders (1814:15–16) noted bark canoes, turtle remains and scoop nets at the southern end of Curtis Island while the ship's artist made sketches of dwellings. In 1846, MacGillivray (1852:57) observed people collecting shellfish on mudflats at Port Curtis.

The most recent pre-colonial historical account mentioning Aboriginal people in the Bustard Bay area dates from October 1846, when Colonel George Barney on board the *Cornubia* en route to Gladstone encountered Aborigines close to their camp while searching the southern entrance of Bustard Bay for freshwater with which to fill the ship's casks. Barney was shown a small freshwater soak in dense scrub about 100m from the base of Round Hill Head (McDonald 1988:10).

From the late 1840s Europeans made rapid inroads into central Queensland. Although the Moreton Bay Penal Settlement had been broken up in 1840 and declared open for free settlement in 1842, squatters were already at the 50 mile settlement limit (Taylor 1967:40). The Wide Bay and Burnett Pastoral Districts were declared by 1848, Leichhardt by 1854 and Port Curtis by the 1856 census. Taylor (1967:62) notes that in the Burnett and Wide Bay Pastoral Districts, large coastal areas remained unused by Europeans in the early period of settlement and retained resident Aboriginal populations into the late 1850s and early 1860s. Godwin (2001) similarly describes large tracts of land between pastoral holdings in the more densely populated Leichhardt and Port Curtis Pastoral Districts to the north and west of Bustard Bay. Aboriginal oral histories attest to continuing use of Bustard Bay by Aboriginal people into the early twentieth century. A senior local Aboriginal community member, Connie Walker (pers. comm. 1999), recalls that as a young girl her family used to visit the Round Hill Creek area from Greenvale Station, near Lowmead, to fish and to make boomerangs, shields and 'nulla nullas'.

Evidence for early European use of Bustard Bay is limited. Although the Bustard Head Lightstation had a permanent presence from 1867, it was not until 1907 that cattle were farmed on Middle Island (Buchanan 1999:64). Anecdotal evidence reported by Buchanan (1994) suggests that the Bowton family, resident on Middle Island from 1907 to 1977, regularly interacted with local Aboriginal people. During a visit to the homestead on the north bank of Middle Creek (Figure 1) in the mid-1970s, Buchanan (1994:102) was shown a collection of 'Aboriginal grinding stones, stone cutting implements and woven baskets'. The area between Middle and Round Hill Creeks is likely to have been logged in the late nineteenth-century, with a sawmill and loading jetty in operation near the mouth of nearby Eurimbula Creek by 1867 (Buchanan 1999:33; Growcott and Taylor 1996:65–66). Eurimbula Creek Station was established in the area of the sawmill in 1868 (QDEH 1994:79), although the Eurimbula run was not officially surveyed and leased until 1878 (Growcott and Taylor 1996:65).

Colonial impact, notably in the form of frontier violence and introduced diseases, precipitated the demographic collapse of local Aboriginal social groups and virtual abandonment of the near-coastal landscape by the late nineteenth century. Of the Tooloola people of the Gladstone area to the immediate north, Curr (1887) estimated that by 1882 a pre-European population of 700 had been reduced to 43. During the 1850s, the Native Mounted Police were active in the region and several massacres occurred in the Miriam Vale area (Clarkson et al. 1995). In the main, by the late nineteenth century Aboriginal populations in the region had coalesced into fringe camps at major European townships such as Miriam Vale in the west and Gladstone in the north (Roth 1898). Although Aboriginal people may have occasionally visited the Bustard Bay area after the 1920s from local Aboriginal population centres such as Berajondo and Gladstone, the entire region appears to have been effectively depopulated by the removal of Aboriginal people to reserves and missions in the early twentieth century (Blake 1991; Evans 1991; Evans and Walker 1977; Williams 1981).

GLASS ARTEFACTS ON THE SOUTHERN CURTIS COAST

The southern Curtis Coast was subject to detailed archaeological study as part of the Gooreng Gooreng Cultural Heritage Project between 1994 and 2004 (Ulm 2006; Ulm and Lilley 1999). Over 70 sites were recorded, eight excavated and 12 radiocarbon dated (Ulm 2006).

Glass artefacts were found on the surface of two sites – the Ironbark Site Complex and Tom's Creek Site Complex. In both cases the *in situ* glass assemblage was recorded in detail and collected for laboratory analysis. Glass was collected using tweezers wrapped in plastic cling wrap, which was changed between samples to avoid cross-contamination of residues, placed into individual plastic press-seal bags and wrapped in bubble-wrap for transport. Samples of near-surface sediments were also taken from the location of the glass scatters to allow analyses of background starch and cellulose.

Use-wear and residue analyses were conducted following the procedures outlined by Loy (1994). All glass objects were subject to preliminary microscopic examination at low magnification to locate regions of residue deposition and select artefacts for further study. Selected artefacts were then examined for use-wear and residues using an Olympus® SZ61 or BX60 metallurgical microscope at high (<800x) magnification using bright-field and dark-field settings and cross-polarised light.

Ironbark Site Complex

The Ironbark Site Complex is a large stone quarry/shell midden located on the southern bank of Middle Creek (Figure 1). The site includes an extensive stone quarry; a discontinuous exposure of shell and stone artefacts along a fringing beach; and small isolated exposures of shell, flaked bottle glass and a large baler shell artefact associated with a stand of cycads on an elevated ridge immediately inland of the quarry. Eight radiocarbon determinations demonstrate occupation by 1640±150 BP (Wk–6361). The most recent radiocarbon age is 200±140 (Wk–8557). For further site details see Ulm (2006) and Ulm et al. (1999, 2005).

Seven bottle glass fragments were recovered from the surface of the ridge south of the quarry (Figures 2–3). The elevated (c. 20 m asl) northeast-southwest trending ridge is vegetated by open woodland dominated by eucalypts (*Eucalyptus intermedia*, *E. acmenioides*, *E. umbra*), with an understorey of native grasses, grass trees (*Xanthorrhoea* sp.) and cycads (*Cycas megacarpa*). *C. megacarpa* is restricted in distribution to a small area of central Queensland centred on Miriam Vale and including the Bustard Bay area (Hill 1992). Some cycad plants in the group suggest considerable age, with trunk heights of up to three metres. Excavation of one of the shell exposures (Square N) showed that cultural material in the area is restricted to near the surface suggesting the possibility that the shell may be contemporaneous with the glass artefacts (see Ulm 2006 for details).

The glass assemblage consists of three bottle bases and four body sherds, one of which conjoins to a base (ISC/FS185–186) (Table 1). At least three different bottles are represented in the assemblage. Only one of the pieces of glass exhibited unambiguous signs of intentional modification, with a body sherd worked into a T-shaped artefact through retouch (ISC/FS184) (Figure 3). The recovery of glass at a long-term Aboriginal site some distance from known early European population centres supports the inference that it was discarded by Aboriginal people. This inference is strengthened by the fact that only incomplete bottles were recovered, suggesting intentional selection and transport of thicker bottle bases to the site. This pattern has been documented elsewhere in Australia, where thick bottle bases were targeted for acquisition (e.g. Allen and Jones 1980; Freeman 1993; Paterson 2008:98–99).

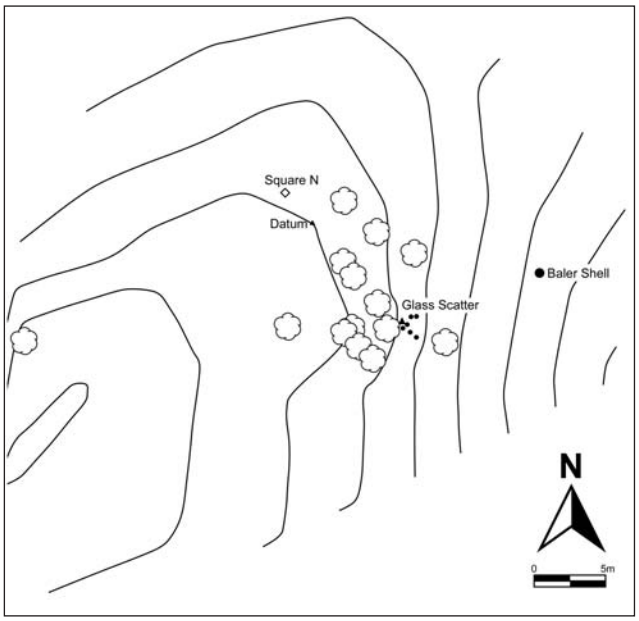

Figure 2: Site plan of Ironbark Site Complex, showing distribution of glass artefacts. Contours are in 0.5m intervals. Only cycads over 50cm in trunk height are shown.

Only one (ISC/FS186) of the seven pieces of glass could be confidently dated with a base mark of the Australian Glass Manufacturers showing manufacture between AD 1900 and AD 1915 (Figure 4) (Arnold 1997:19; Boow 1991:180; Nolan 1992:30). Another bottle base (ISC/FS182) is dated to between AD 1820s and AD 1920s on the basis of a deep push-up with ridges made by the pontil resembling a Ricketts-type mould (Jones and Sullivan 1989:29–30). A more precise date for manufacture cannot be assigned to this bottle, although its close association with the base confidently dated to AD

Table 1: Description of glass artefacts, Ironbark Site Complex. ^= subject to detailed use-wear and residue analysis. FS#= field specimen number.

FS#	Square	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)	Description	Colour
181^	–	18	34	3	2.7	Fragment	Clear, translucent
182	–	54	75	6	208.5	Base	Olive
183^	–	59	86	13	200.9	Base, octagonal	Pale green, translucent
184^	–	43	56	4	8.6	Fragment	Pale green, translucent, retouched
185	–	58	76	8	66.9	Fragment	Pale green, translucent
186	–	68	78	5	150.8	Base	Pale green, translucent
187^	–	23	38	3.5	4.8	Fragment	Frosted, translucent

1900–AD 1915 suggests that the entire assemblage dates to the late nineteenth or early twentieth century.

Building on the limited study reported by Ulm et al. (1999), four artefacts have now been subjected to intensive use-wear and residue analysis (ISC/FS181, 183, 184,187). All artefacts were found to exhibit plant tissues and an opalised film with a gritty, textured appearance. Common structural elements include bark, insect casings, seed casings and micro-hyphae (fungi). Residues were found set back from the cutting edge, and comprise quantities of plant materials and starch grains consistent with use for a variety of plant processing activities. Although plant residues were observed on the surface of all seven glass objects, only two sherds (ISC/FS181 and 187) exhibited use-wear and residue features suggestive of systematic use.

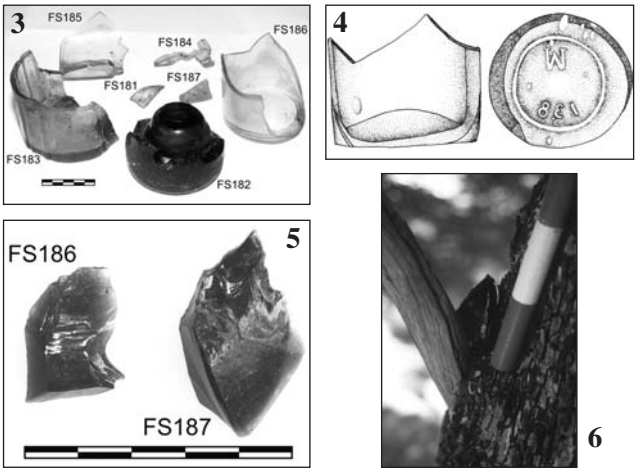

Figure 3: Ironbark Site Complex glass assemblage. Scale=1cm intervals (Kim Vernon).

Figure 4: Sketch of broken bottle base (ISC/FS186), Ironbark Site Complex, showing manufacturer's mark dating to AD 1900–AD 1915. Scale=Base diameter is 78mm.

Figure 5: Retouched glass artefacts (TCSC/FS186 and 187), Tom's Creek Site Complex. Scale=1cm intervals (Kim Vernon).

Figure 6: Retouched glass artefact (TCSC/FS188) cached in quinine tree, Tom's Creek Site Complex, facing north. Scale=5cm intervals (Sean Ulm).

ISC/FS181 has edge-damage on both the ventral and dorsal surfaces including feather and bending flake scars and rounded margins (Figure 7) associated with deep furrow striations at approximately 45° to the edge on the ventral surface (Figure 8) and longitudinal striations running parallel to the edge on the dorsal surface. Residues include plant tissues (Figure 9), some of which are woody (lignified), plant fibres, resin, both charred (black) and undamaged (amber-brown) (Figure 10), and small (2–4µm) starch grains occurring in clumps set back from the edge. This artefact has been used to cut (longitudinal striations and a series of rounded bending flake scars) and scrape (edge damage and 45° striations) resinous plant material, probably wood.

In addition to fungal tissue and spherulites (largest 14µm), ISC/FS187 features non-diagnostic and parenchymal plant tissue (Figure 11) and patches of abundant small starch grains (ca.5µm) (Figure 12) in association with angled striations (Figure 13) and edge fracturing. The abundant starch grains, parenchymal tissue and edge damage along the distal edge are indicative of plant-food processing activities. Some of the residue around the starch grains appears to be damaged starchy material.

Ulm et al. (1999) associated some of the plant residues on ISC/FS187 with processing of cycad (*C. megacarpa*) on the

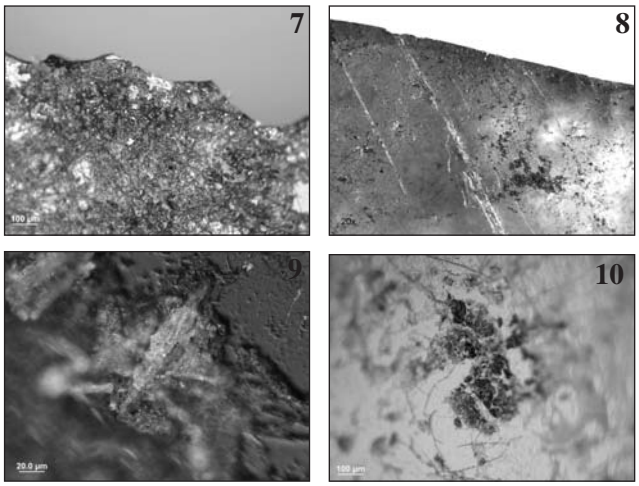

Figure 7: Edge-damage showing bending flake scars with rounded margins (ISC/FS181 dorsal), bright-field (x100) (Gail Robertson).

Figure 8: Use-wear striations at 45° to the working edge (ISC/FS181 ventral) (x20) (Gail Robertson).

Figure 9: Plant tissue (ISC/FS181 ventral), dark-field (x500) (Gail Robertson).

Figure 10: Charred resin (ISC/FS181 dorsal), dark-field (x100) (Gail Robertson).

basis of starch and sheets of tissue with large storage cells identified in cross-section. A single reference slide of *C. megacarpa* shows that the size of starch grains has a wide range, skewed towards larger sizes (6–26µm) than those observed on the tool. This tentative identification needs confirmation through further characterisation of variability in cycad starch size and morphology. Another residue feature provides an independent source of evidence for cycad use. Blue-green material (possibly blue-green algae or cyano-bacteria) extends in patches half-way up ISC/FS187 from the distal end on both sides. Cyanobacteria live in the surface and near-surface coralloid roots of cycads (Cox et al. 2003) and produce the neurotoxin ß-methylamino-L-alanine (BMAA), which is concentrated in cycad seeds (Banack and Cox 2003).

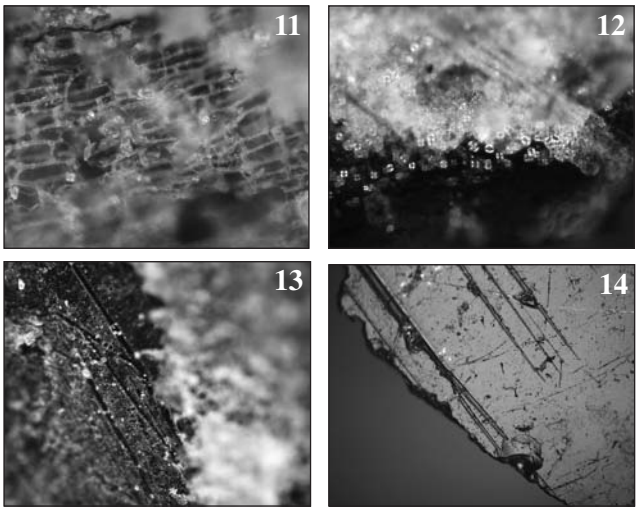

Figure 11: Parenchymal tissue (ISC/FS187), bright-field cross-polarised light (x500) (Sue Nugent).

Figure 12: Small starch grains (ca.5µm) (ISC/FS187), bright-field cross-polarised light (x500) (Sue Nugent).

Figure 13: Angled striations (ISC/FS187), dark-field (x200) (Sue Nugent).

Figure 14: Striations and scarring (TCSC/FS186), dark-field (x100) (Kim Vernon).

The association of blue-green algae with the working margins of the tool are suggestive of cycad processing.

Use-wear and residues on the Ironbark Site Complex glass artefact assemblage are consistent with use for a range of plant processing activities, perhaps including woodworking.

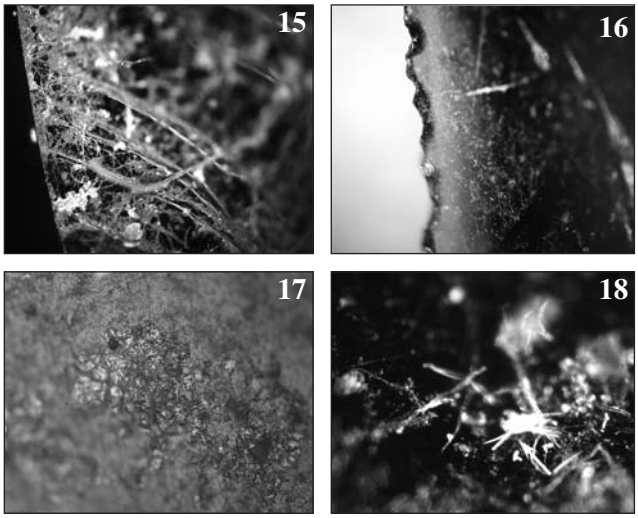

Figure 15: Use-wear striations at 45° to the working edge (TCSC/FS153), dark-field (x100) (Kim Vernon).

Figure 16: Flaked scars with pronounced edge-rounding (TCSC/FS152), dark-field (x100) (Kim Vernon).

Figure 17: Resin (TCSC/FS153), bright-field cross-polarised light (x200) (Kim Vernon).

Figure 18: Bundle of raphides (TCSC/FS153), dark-field (x500) (Kim Vernon).

Tom's Creek Site Complex

The Tom's Creek Site Complex is a large, stratified midden exposed over low dunes abutting the base of a rocky scree slope at the junction of Round Hill Creek and Tom's Creek (Figure 1). Close to the base of the slope, surveys located a scatter of dark green bottle glass covering an area of ca 10 m^2 (Figures 5–6). Ten radiocarbon dates indicate occupation from 1110±70 BP (Wk-7685) into the historical period, with a very recent radiocarbon date returning a modern value (Wk-7681). For further site details see Ulm (2006).

Glass fragments were located in a level area with an open canopy of large eucalypts interspersed with clumps of tall cabbage palms (*Livistona decipiens*) and an understorey of lantana (*Lantana camara*), immature cabbage palms, ground vines and shrubs. A stand of large (> five metres high) cycads (*C. megacarpa*) occurs on a rocky slope to the south.

A 2 m x 1.5 m grid (Squares E–P) was established over the main concentration of bottle glass, with a further single isolated square (Q) to the northeast (Figure 19). Surface leaf litter and undergrowth were systematically removed from a ca 40 m^2 area to expose the extent of the glass scatter. The surface of each square was systematically mapped, photographed and described to show the presence, location and orientation of surface materials, including glass, stone artefacts and shell material.

In total, 36 bottle glass artefacts, weighing 214.8g, were recovered from the surface of the site (Table 2). Most (90 per cent) of the glass was scattered over a three m^2 area (Squares E–P) with two retouched artefacts located ca four metres to the northeast (Square Q). Two more artefacts were recovered: a large retouched artefact apparently cached in the fork of a quinine tree (*Petalostigma pubescens*) ca. 145 cm above the ground and ca. three metres east of the main scatter (Figure 6) and an isolated artefact ca. three metres south of the main grid. The assemblage consists of two bottle base sherds and 34 body sherds. No rim fragments were identified, although neck fragments may be represented in the body sherd count owing to the small size of many sherds (average weight six g), limiting confidence in ascription of body part. All of the glass may be derived from the same bottle. The absence of rim sherds raises the possibility of deliberate breakage of the bottle prior to transport (see Allen and Jones 1980; Freeman 1993).

Table 2: Description of glass artefacts, Tom's Creek Site Complex. # = retouched. * = recovered outside of grid. ^ = subject to detailed use-wear and residue analysis.

FS#	Square	Length (mm)	Width (mm)	Thick-ness (mm)	Weight (g)	Type	Colour
152^	F	18.6	13	2.2	0.6	Fragment	Olive
153^	F	53.1	28.6	6.9	16.3	Fragment	Olive
154	F	25.6	16.7	3.5	1.4	Fragment	Olive
155	F	23.1	13.3	2.7	1.7	Fragment	Olive
156	F	15.3	9.6	2	0.2	Fragment	Olive
157	G	35.4	22	4.8	4.9	Fragment	Olive
158	G	16.8	8.9	1.8	0.3	Fragment	Olive
159	J	22.3	15.1	2.4	1	Fragment	Olive
160	J	32.3	18.9	3.7	2.6	Fragment	Olive
161	J	28.6	22	3.7	2.7	Fragment	Olive
162	J	33	13.6	4.9	4	Fragment	Olive
163	G	9.7	7.4	4.4	0.2	Fragment	Olive
164	K	30	13.6	4.9	4	Fragment	Olive
165	K	30.4	27.1	4.1	5.2	Fragment	Olive
166	K	54.2	42.9	1.9	34.9	Base	Olive
167	K	18.4	14.6	2.4	0.7	Fragment	Olive
168	K	42.6	27	2.9	4.5	Fragment	Olive
169	K	48.9	31.6	5.5	14.1	Fragment	Olive
170	K	46.8	27.2	4.6	9.1	Fragment	Olive
171	K	31.5	16.9	2.6	2	Fragment	Olive
172	K	37	22.7	3.2	5.4	Fragment	Olive
173	L	36.3	16.1	3.7	3.5	Fragment	Olive
174	M	22.9	13.1	2.8	1	Fragment	Olive
175	L	5.3	2.7	0.5	>0.1	Fragment	Olive
176	N	31.4	15.5	2.8	1.7	Fragment	Olive
179	O	26.2	24.6	3.1	2.2	Fragment	Olive
180	O	19.1	16.3	2.6	1.2	Fragment	Olive
181	O	17.9	17.2	2.4	38	Fragment	Olive
182	O	13.1	10	2	0.4	Fragment	Olive
183	P	24.3	19.9	2	1.3	Fragment	Olive
184	P	22.1	19.8	2.2	1.5	Fragment	Olive
185	P	6.9	3.4	1.1	0.1	Fragment	Olive
186#^	Q	30	21.2	3.8	2.4	Fragment, retouched	Olive
187#^	Q	39.5	22.1	7.1	6.6	Fragment, retouched	Olive
188#^	*	61.7	49.6	6.6	30	Base, retouched	Olive
189	*	44.1	30.6	5.1	8.6	Fragment	Olive

Three of the artefacts (TCSC/FS186, 187, 188) exhibit marginal retouch and were located away from the main scatter (Figures 5–6). The spatial separation of the remainder of the glass scatter from the glass artefacts exhibiting retouch is noteworthy (see Figure 19). It is possible that the denser concentration of glass fragments represents a manufacturing area and the two glass flakes in Square Q and the cached artefact in the quinine tree represent artefacts actually used or used more intensively. The retouched artefact in the tree (TCSC/FS188) was found to conjoin with an unretouched flake (TCSC/FS166) from Square K to form part of a bottle base, confirming the association between the glass scatter and cached artefact.

The assemblage consists of so-called 'black' glass, which is actually dark green. 'Black' glass was manufactured from

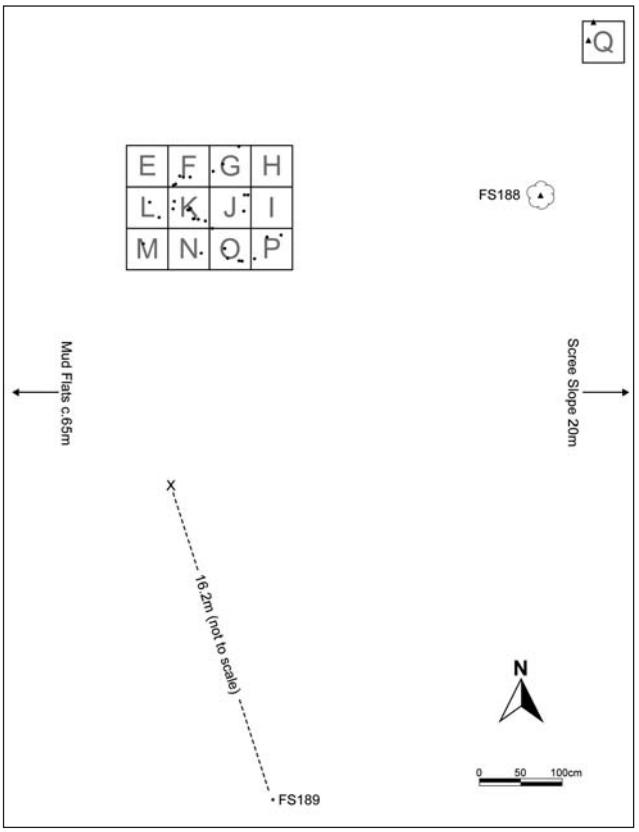

Figure 19: Site plan of the Tom's Creek Site Complex, showing distribution of glass artefacts. Triangles indicate retouched glass. Solid circles indicate unretouched glass. FS188 is the retouched glass artefact located in the fork of a tree.

the seventeenth to the late nineteenth centuries (Jones 1986:11–15; Jones and Sullivan 1989:14). Although a more precise assignment of age is not possible in the absence of manufacturer's marks or other diagnostic features, the glass in the assemblage is dated to the late nineteenth/early twentieth centuries.

Five artefacts, including the three retouched artefacts, were targeted for further study (TCSC/FS152, 153, 186, 187, 188). Areas of shallow, parallel striations were found on most of the artefacts (Figure 14), speculated to result from sand grains being trapped between the artefact and another object during use. Striations are present at 90°, 60° or 45° to an obtuse edge and are associated with edge-rounding (Figures 15–16). The two retouched artefacts recovered from Square Q (TCSC/FS186 and 187) appear to be well-worked, with deep scratches, ladder cracks, internal shatters, Walner lines and Hertzian cones observed and thought to be associated with woodworking activities (after Hardy and Garufi 1998).

All five artefacts were found to be covered in copious plant residues characterised by quantities of degraded plant cellulose, resin (Figure 17), minute bark fragments, orange, resinous globules and starch grains associated with a translucent milky film, frequently interspersed with fungal micro-hyphae. Identified structural elements include seed casings and abundant calcium oxalate raphides (including a bundle of five raphides on TCSC/FS153, see Figure 18). Three sections of xylem (secondary parenchymal wall thickening) were also found. Common to all angiosperms (flowering plants), these elements are consistent with use of the artefacts on cycad seeds, tubers or mangrove plants. A large number of rectangular phytoliths were found on TCSC/FS186.

The use-wear and residue elements combined indicate that the glass artefacts were used for a variety of activities, including woodworking and probably tuber processing.

DISCUSSION

Despite Aboriginal people effectively disappearing from major European historical sources for Bustard Bay in the mid-nineteenth century, flaked bottle glass at the Ironbark Site Complex and Tom's Creek Site Complex confirms that Aboriginal people at Bustard Bay continued to use traditional camping places well into the period of European occupation. The fact that two sites first occupied around 1500 years ago continue to be used in the post-contact period is not simply fortuitous, but rather points to a persistence of knowledge about the location of these places in the landscape.

Plant and woody tissues observed on the glass artefacts suggest use primarily for woodworking at the Tom's Creek Site Complex and primarily plant processing, including the possibility of toxic plant preparation of cycads, at the Ironbark Site Complex. The discovery of two glass artefact assemblages in close proximity, with different use-wear and residue characteristics and, by inference, different task associations, suggests that glass had become a commonly used resource in the region, adapted to both traditional woodworking and plant processing. The discovery of possible cycad residues on the glass artefacts is significant in this context. Cycads appear to have been widely used throughout central Queensland as a source of carbohydrate in the late Holocene (Asmussen 2008; Beaton 1982; Beck 1992), with a variety of processing techniques adopted to remove toxins before consumption. The identification of possible cycad processing at the Ironbark Site Complex in the early twentieth century indicates that complex food preparation activities may have been undertaken well after a permanent and sustained non-Indigenous presence was established in the region. Logically, this evidence suggests that occupation during this period was not ephemeral, but rather comprised a range of activities which probably included shellfish gathering and artefact manufacture in addition to plant food processing and woodworking.

A complementary study of stone artefacts from excavated pre-European contexts at the Ironbark Site Complex and Tom's Creek Site Complex revealed a similar suite of archaeological residues to those found on the glass artefacts; comprising resin, cellulose, starch grains, parenchymal tissue and charcoal (Francis 1999). These residue elements are consistent with the use of stone artefacts in a variety of plant processing activities, demonstrating continuities in both technology and function between stone and glass tool technologies before and after the arrival of Europeans.

These data show that in the early twentieth century, well after permanent non-Indigenous settlement of this part of Queensland there were still opportunities for Aboriginal people to continue to use traditional cultural places. Godwin (2001:109) has described such culturally discontinuous landscapes as a mosaic hosting many 'interstitial spaces', where people could 'attempt to occupy the voids and pockets that have been left in the mosaic of pastoral expansion, and maintain a traditional lifestyle perhaps supplemented in some measure with new resources obtained from the invaders.' For northwest Australia, Head and Fullagar (1997) have similarly pointed out that the pastoral landscape provided opportunities for Aboriginal people to negotiate and maintain social obligations and attachments to particular places.

For Bustard Bay, the archaeological record shows both continuity and change in local Aboriginal lifeways and strategic and repeated patterns of occupation of a range of

long-term cultural places which are consonant with Aboriginal oral histories (see Clarkson et al. 1995) and ongoing Gooreng Gooreng connections to the Bustard Bay area (O'Brien 2008).

CONCLUSION

Glass artefacts at the Ironbark Site Complex and Tom's Creek Site Complex provide direct evidence for the persistence of Aboriginal occupation and use of coastal landscapes fringing Bustard Bay into the historical period. The continuing use of long-term cultural places into the post-contact period clearly demonstrates historical continuities in the use of, and transmission of knowledge about, culturally important places. The use-wear and residue results demonstrate use of glass artefacts for a range of woodworking and plant processing activities, possibly including labour-intensive plant processing, emphasising continuity and transformation rather than disjuncture in traditional practices and land-use patterns at a time when non-Indigenous incursions are thought to have had a profound impact on Aboriginal lifeways. Future applications of use-wear and residue studies to contact period artefacts will contribute to more nuanced understandings of shared cultural landscapes.

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