Dynamic landscape, dynamic practice: Aboriginal dwelling beside the Carran Carran–Durt'yowan floodplains (Thomson River–Latrobe River, Central Gippsland)

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Abstract

Recurring occupation beside waterways is an essential part of Aboriginal dwelling and movement in the landscape. Riverbanks and their wider floodplains were repeatedly inhabited as hunting and fishing grounds and to gather plants and other materials; moreover, Aboriginal people used rivers and creeks as routeways and landmarks to navigate Country, for meetings and ceremonies, to affirm boundaries and territorial claims; and they were sacred features whose origins were captured in stories and songs. Archaeological investigations often encounter material that hints at persistent occupation of riverine landforms, but it is rare to conclusively prove the overall duration that a place was inhabited and the length of occupation episodes. Excavations near Sale in central Gippsland, in GunaiKurnai Country, identified one such place. Cultural deposits buried in the sands of an alluvial rise at Fulham include hearths and concentrations of stone artefacts up to a metre deep. Radiocarbon dating shows two distinct occupation phases—in the Late Pleistocene and Holocene eras—that were separated by a gap of up to eight thousand years. The results underline the enduring significance of the alluvial plains around the confluence of Carran Carran (Thomson River) and Durt'yowan (Latrobe River) and show habitation by GunaiKurnai Ancestors over vast timespans as the climate, water level, landforms and ecology of the wider estuarine district changed. They highlight spatial and temporal connections between the upper and lower reaches of these river systems over several millennia, giving a unique, long–term perspective on human responses to shifts in climate and water flows.

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Introduction

Rivers are dynamic elements of the landscape which have been characterised as 'cultural artefacts' whose flows, associated landforms and meanings are shaped through a combination of natural and cultural forces (Edgeworth 2011; Hussain and Floss 2016). In Australia, rivers and creeks not only provide fresh water and support an ecology to obtain food and other resources but are embedded in the practices, beliefs, and histories of Aboriginal peoples. Examining Aboriginal dwelling in riverine settings gives a unique, long–term perspective on human interactions with landscapes that are continually changing as a consequence of shifts in climate, water levels and vegetation.

Archaeological studies have identified a correspondence between material traces of Aboriginal people and proximity to water. This correspondence is reflected in heritage legislation, such as Victoria's *Aboriginal Heritage Act* 2006, which designates areas of cultural heritage sensitivity close to waterways; surveys which recorded the frequency of Aboriginal places beside creeks in Melbourne influenced the identification of such areas of sensitivity (Du Cros and Rhodes 1998). Analyses of site distributions in water catchment areas often stress the presence of fresh water, foodstuffs and other resources which Aboriginal people targeted as part of adaptive and exploitative strategies. Waterways were clearly a primary focus of Aboriginal occupation, supporting a wide variety of flora and fauna, however, beyond providing for subsistence needs they were also dwelling places, routeways to navigate Country and define territory and boundaries, and sacred features whose origins and meanings were recounted in stories and songs.

Considering Aboriginal interactions with rivers and their catchments broadens horizons on the dynamic qualities of waterways. Alluvial plains often encompass former delta, lagoon and swampland spanning very large areas that are distant from current watercourses. Thus, river systems support a far wider 'cultural catchment' than can be expressed in physiographical designations. A broad–scale view which looks beyond land designated in heritage regulations as being areas of Aboriginal cultural heritage sensitivity highlights connectivity between different riverine zones and the temporal links between people who occupied these environments over long timespans.

Here, we examine recurrent occupation of riverine environments by presenting a case study from central Gippsland, in GunaiKurnai Country, where excavations on an alluvial rise uncovered cultural deposits that span several thousand years. Interpreting the episodic usage of this place demands an appreciation of the dynamic landscape as it changed through time. The dynamism of river systems is mirrored by the dynamic practices of Aboriginal people who both instigated and responded to changing landforms and ecologies. While fluvial landforms could become optimal sites for dwelling and hunting as a result of climatic and geomorphological processes, people's actions were not simply reactive to external conditions—they could be formative. Land management that involved regulating vegetation regimes and modifying water flows caused physical and ecological changes and these practices were bound with the meaning that Aboriginal people drew from the landscape. Therefore, understanding recurrent occupation beside rivers requires going beyond functionalist explanation as the practice is engrained in social and spiritual aspects of Aboriginal lifeways.

South Gippsland's river plains: a dynamic landscape

Archaeological excavations at Fulham, on the alluvial plain west of Sale, revealed the longevity and repeated nature of occupation by GunaiKurnai Ancestors along the lower reaches of Carran Carran (meaning brackish water—the Thomson River) and Durt'yowan (meaning finger—the Latrobe River) (**Figure 1**). Fulham is a rural area of generally flat land that slopes gently south to the Latrobe River valley, much of which is divided into rectangular fields used for pastoral and crop farming. This locality is situated along the Princes Highway, which was built in 1920 following a routeway used since the mid–19th century but which may have had far greater antiquity (GunaiKurnai Land and Waters Aboriginal Corporation 2015:58). Running parallel to the north of the highway is the Traralgon–Sale railway line, opened in 1877. Fulham is located within the Gippsland Sunklands physiographic unit whose geomorphology is characterised by broad alluvial valleys with lateral terraces and extensive swamps (Jenkin 1971:27). Haunted Hills Gravel, consisting of fluvial sand, silt and gravel that date from the Pliocene to Miocene epochs of the Tertiary period, underlies later alluvial deposits (Douglas 1984:10).

The region's geography has changed considerably

Figure 1. Digital terrain model map showing Fulham and the lower Latrobe and Thomson Rivers.

since the last glacial maximum (17–20 ka), when the landscape was characterised by a marshy plain, in comparison to the lake and riverine system of modern times. Alluvial plains formed during the Quaternary period when sediments were deposited by waterways flowing into Lake Wellington, the westernmost of the Gippsland Lakes, which are a series of coastal lagoons that are separated from the sea by sandy barriers (Bird 2010). These marine and fluvial sand barriers formed sequentially during the Late Pleistocene, and they are grouped into 'prior', 'inner' and 'outer' barriers. Accretion of the barriers constituted 'a complex process of sequential depositions and onlapping of marine and aeolian sediments', with phases of deposition centred on interstadial peaks dated to 59–72 ka, 40–48 ka and a third phase in the last glacial maximum which is suggested to be the result of a tsunami (Bryant and Price 1997).

Processes of inundation, deposition and erosion affected by sea level and climate contributed to a dynamic topography and vegetation. At its outflow into Lake Wellington, the Latrobe River became a delta that grew as a result of sedimentation in bordering reed swamp; at times of high water, estuarine swamps and lagoons formed (Bird 2010:1389). While fluctuations in water level and climate are salient factors, human interventions also impacted upon flows and vegetation. Land was managed through selective burning and watercourses were modified by blocking channels to extend swamps, as attested in historical accounts from Gippsland (Gammage 2011:171,226). Pollen analysis of swamps close to the inner sandy barrier, near Sperm Whale Head, identified changing vegetation patterns with increased water level from 7,000–5,200 BP followed by drier conditions in the Late Holocene (Hooley et al. 1980). Dry heath was replaced by tall open forest with less scrub and heath; a decrease in Casuarina trees and high charcoal levels indicate more frequent fires, a process which 'may have been initiated or accelerated by the activities of aboriginal man' (Hooley et al. 1980:361)

Accounts of GunaiKurnai people recorded after colonisation in the 1840s provide windows on traditional land management, social structures and belief systems (Wesson 1994). Ethnographic research by Alfred William Howitt recorded how the 'Kunai of Gippsland' occupied a large area between the Bass Strait coast and the Dividing Range and were divided into five clans who spoke three dialects that were mutually unintelligible (Howitt 1904:73). The tribe which inhabited the plains west of Sale at the time of colonisation is most likely the Bunjil Kraura and/or Woollum Woollum, groups whose territory is located around Durt'yowan from Longford and Rosedale, between the territories of the Bratauolung and Briakolong (Wesson 2000:28). GunaiKurnai people moved between diverse mountain, plains and coastal environments on a seasonal and intermittent basis—the land's ecological diversity and abundance meant that they enjoyed a level of self–sufficiency that might have led them to be relatively isolated from neighbouring tribes (Wesson 2000:45).

Archaeological projects in Gippsland, especially in highland and coastal settings, have documented the antiquity of occupation by GunaiKurnai Ancestors. Caves in the Eastern Highlands have been a particular focus, namely Cloggs Cave on the Buchan River (Flood 1974; David et al. 2021a; David et al. 2021b), New Guinea II on the Snowy River (Ossa et al. 1995) and Wangangarra Rockshelter on the Mitchell River (Roberts et al. 2020), all three of which have evidence of occupation dating from more than 20,000 years ago. At Wangangarra Rockshelter, 54 km to the northeast of Fulham, a small excavation in 2017 recovered cultural deposits above burnt bedrock dated to 27,970 cal BP, with increased burning and sedimentation occurring after 5,810 cal BP signalling an upturn in occupation (Roberts et al. 2020:9–11). The researchers note that 'all of the faunal remains definitely deposited by the Old People came from the nearby riverine environment. The implication is that the Mitchell River played an important role in the determination of resource scheduling and site location by the Old People' (Roberts et al. 2020:20).

Compared with the plentiful evidence for long–term occupation of riverside caves in the high country, less is known about open sites on the plains of these rivers' lower reaches. Previous investigations near Fulham have recorded mostly sparce stone artefact deposits, often in shallow or disturbed soils, though more substantial finds were made at Blind Joe Creek 1 (VAHR 8221–0174) where excavations recovered over 250 lithic artefacts from silty sand and underlying clay deposits; two charcoal samples recovered during initial test excavations returned radiocarbon dates of 3,830–3,630 cal BP and 7,245–7,005 cal BP (Noble et al. 2013:945–949); another two samples from subsequent salvage excavations returned date ranges of 2,710–2,360 cal BP and 4,090–3,890 cal BP (Dugay–Grist et al. 2014:214–215). These results indicate persistent habitation of an alluvial rise at the edge of the Latrobe River valley that foreshadow the evidence for multiphase occupation at Fulham.

Investigations at Fulham: background, aims and methods

As part of planning for the expansion of the Princes Highway into a dual carriageway between Traralgon and Sale, VicRoads commissioned a series of archaeological projects to identify, record and inform management of Aboriginal cultural heritage (Phillips et al. 2010; Noble et al. 2013) and to recover material and information from Aboriginal places impacted by the development (Watson and Anderson 2010; Noble 2013; Dugay–Grist et al. 2014). Cultural heritage management plans (CHMPs) prepared for land west of Sale addressed a 2.3 km corridor where sparse subsurface artefacts and one surface artefact were recorded (Anderson 2014; Scibilia and Anderson 2015). Along a 3.95 km corridor further west, more substantial cultural deposits were identified (Minos et al. 2015).

Subsurface testing east of Hopkins Road recorded 136 lithic artefacts contained in deep sand deposits that extend approximately 200 m east/west and span the whole width of the investigated corridor, up to 50 m south of the highway verge (Minos et al. 2015:50–56). This Aboriginal place was registered with the Victorian Aboriginal Heritage Register (VAHR) as Fulham Sands 1 (VAHR 8221–0219); two small surface and subsurface artefact deposits were recorded directly to the west (VAHR 8221–0217) and east (VAHR 8221–0218). As the proposed road construction would disturb the ground at these locations, management conditions were developed in the CHMP to recover Aboriginal cultural material and information (Minos et al. 2015:66–67).

Archaeological fieldwork was carried out at Fulham Sands 1 (VAHR 8221–0219) in December 2015 and January 2016 by archaeologists from Dr Vincent Clark & Associates and members of GunaiKurnai Land and Waters Aboriginal Corporation, the area's Registered Aboriginal Party (RAP) (**Figure 2A**) (Anderson et al. 2016). The excavations had two general aims: compliance and research. The first aim was to fulfil the CHMP conditions which required excavating a minimum area of 10 m^2 with provision for additional excavation if significant deposits were found (Minos et al. 2015:66–67). This offered an opportunity to investigate aspects of the place from a research perspective. Whilst seeking to understand the broad–scale physical and temporal context, the project's scope was limited. The area stipulated for excavation was a fraction (less than 0.2%) of the registered place extent which itself was arbitrarily constrained by the highway to the north and the width of the investigated corridor to the south. Nevertheless, this archaeological intervention enabled examining an Aboriginal place in a part of Gippsland that has received less attention than coastal and upland settings.

An important research aim was to examine the connection of the place's past inhabitants—Old GunaiKurnai Ancestors—with the local and wider landscape. To achieve this goal, the first set of questions related to the place's physical and ecological setting. How can the excavated landform and its paleoenvironment be characterised? What post–occupation processes were at play, and how did recent factors affect the burial and preservation of cultural deposits? Building on issues surrounding environment and site formation were questions about the nature and length of occupation. For how long was this place inhabited? Are there signs of multiple phases of use or was there occupation during a single period? Was this a place of seasonal or semi–permanent habitation or was it occupied sporadically over short phases? Addressing timescales of occupation led to further questions concerning the practices of those who dwelt here. What range of activities took place and was there a predominant use of the place? What does the nature of recorded features and composition of artefact assemblages tell us about the intentions and connections of the people who left these traces?

The placement of excavation trenches at Fulham Sands 1 (VAHR 8221–0219) was informed by the results of earlier subsurface testing and an attempt to gain coverage of previously untested areas. Trenches were located across the east/west width of the recorded place extent, set back from the existing road to avoid disturbed ground (**Figure 2B**). These captured slight elevational variations including the marginally raised ground to the east and a shallow hollow in the centre. Having determined the location of a trench, the area was measured, marked out and the corners recorded using a hand–held DGNSS receiver (Trimble GeoXH 6000). Elevation levels were recorded with a dumpy level by taking readings from fixed datum points, providing accurate readings calculated in accordance with the Australian Height Datum (AHD). Differences in ground level across the site are less than a metre (25.24–26.12 m AHD) (**Figure 2C**). Separate datum pegs were positioned beside each trench to take depth readings specific to these excavation units. Trenches initially measured 2 x 1 m, some of which were then expanded; all excavation and recording took place in 1 x 1 m units. Hand–held tools were used to remove 100 mm vertical slices or spits within each unit; all excavated sediment was sieved through 3 mm mesh and recovered artefacts were collected according to unit and slice. On completing each trench, levels were recorded, photographs were taken of plans and profiles and measured section drawings were made.

During the initial excavation session an area of 10 m^2 was exposed, fulfilling the minimum quota required by the CHMP. However, the discovery of significant cultural deposits led to agreement between the sponsor, the RAP and the heritage advisor that further excavations were warranted. A second fieldwork session in January 2016 subsequently focused on the east of the site where the ground rises marginally and where cultural deposits are concentrated; an additional area of 9 m^2 was excavated. Therefore, at completion a total area of 19 m^2 was excavated across eight trenches (named T1–T4 and T6–T9) (**Table 1**).

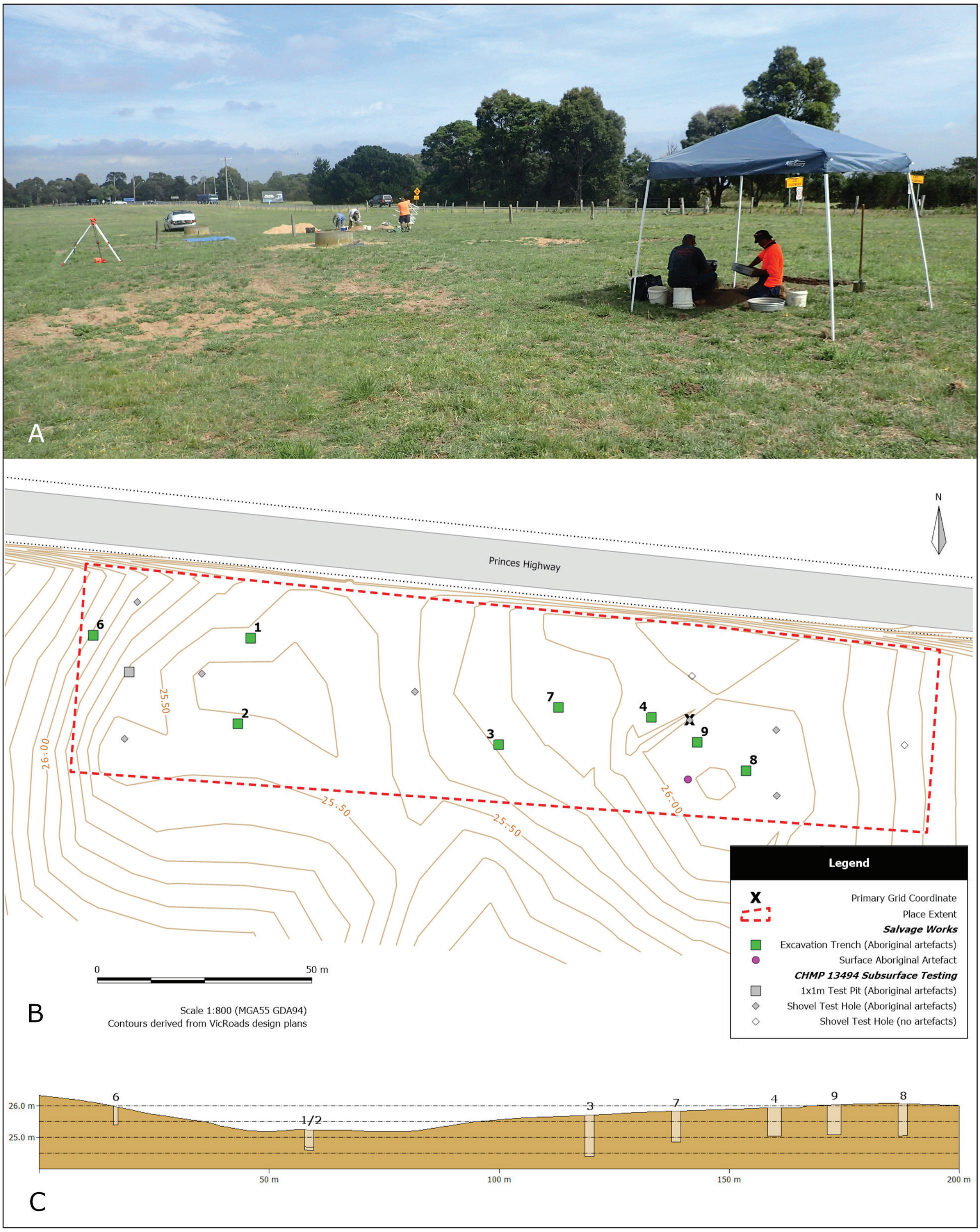

*Figure 2: Excavations at Fulham: **A**. northwest–facing view of the excavation area; **B**. map of trench locations; **C** . elevation of the east/west terrain with trench depths.*

Trench	Surface area (m²)	Surface elevation (AHD)	Maximum depth (mm)	Lithic artefact number	Lithic artefact weight (g)
T1	2	25.24 m	700	13	22.07
T2	2	25.29 m	600	32	12.68
T3	2	25.66 m	1200	94	195.29
T4	3	26.06 m	1100	186	381.84
T6	1	25.94 m	600	3	10.52
T7	4	25.85 m	1000	368	470.04
T8	2	26.12 m	1100	207	228.94
T9	3	26.12 m	1000	160	407.45

Table 1. Excavation trenches at Fulham Sands 1 (VAHR 8221–0219).

Context	Depth (mm)	Consistency	Inclusions	pH	Colour	Munsell
C1	0–100	Humic silty sand; medium fine	Organic, Charcoal, rounded pebbles	5	Dark brown	10YR 5/3
C2	100–200	Humic sand; medium fine	Charcoal, rounded pebbles	4.5	Pale brown to greyish brown	10YR 6/3
C3	100–800	Sandy loam; fine	Fine quartz grits, frequent charcoal	6	Very pale brown	10YR 7/4
C4	600–1000	Sand; medium fine	Clay patches, sandstone nodules	7	Yellow	10YR 7/6
C5	>800	Clayey sand; medium coarse	Peat traces	7	Yellowish brown	10YR 5/6

Table 2. Soil contexts at Fulham Sands 1 (VAHR 8221–0219).

Soils and stratigraphy

There is general uniformity in the consistency and stratigraphy of the excavated soil across the Aboriginal place. Differences in the depth range of soil contexts correspond with subtle variations in ground levels which are the result of differential deposition and erosion. Five soil contexts were identified (**Table 2**). Below the sod (C1), the topsoil (C2) consists of humic sand containing organic material and zones of charcoal to a maximum depth of 200 mm. This transitions to fine–grained, pale brown sand (C3) between 200–600 mm depth and contains frequent charcoal accumulations and staining with moderately frequent lithic artefacts. Below 600 mm is coarser grained sand (C4) which is light yellow to dark reddish yellow, contains discrete charcoal pieces and some rounded pebbles and a high density of lithic artefacts; at lower depths this sand has inclusions of agglomerated sand and sandstone nodules.

Between 800–1,000 mm depth is another transition to darker yellowish–brown clayey sand which is coarse grained, moist and culturally sterile (C5). Mechanically excavated geotechnical pits completed prior to the archaeological investigations found the clayey sand of C5 continues to depths more than 3 m below the surface (Anderson et al. 2016:88–92). Patches and veins of brown discolouration with organic content run through C5 at depths below 1 m, most clearly in T3 (**Figure 3A**). These are thought to be either a 'tidemark' which is the result of formerly standing water or perhaps a layer of peat from a former swamp that was subsequently covered over with alluvial sand. No artefacts or charcoal are present in C5 and their absence is one indicator of sedimentation which occurred prior to Aboriginal occupation.

Cultural deposits

Cultural deposits left by GunaiKurnai Ancestors at Fulham consist of hearths in the form of ash deposits and lithic artefacts—no bone, shell or other faunal remains were recovered. Consistencies in the depth and distribution of this material show it to be contained in secure, stratified soil contexts which have undergone little or no modern anthropogenic disturbance and limited evidence for bioturbation. Moreover, the stratigraphy of the cultural material—consisting of hearths containing small numbers of artefacts and substantially higher artefact concentrations in the sediments underlying the hearths—hints at deposition occurring at different phases over extended periods of time.

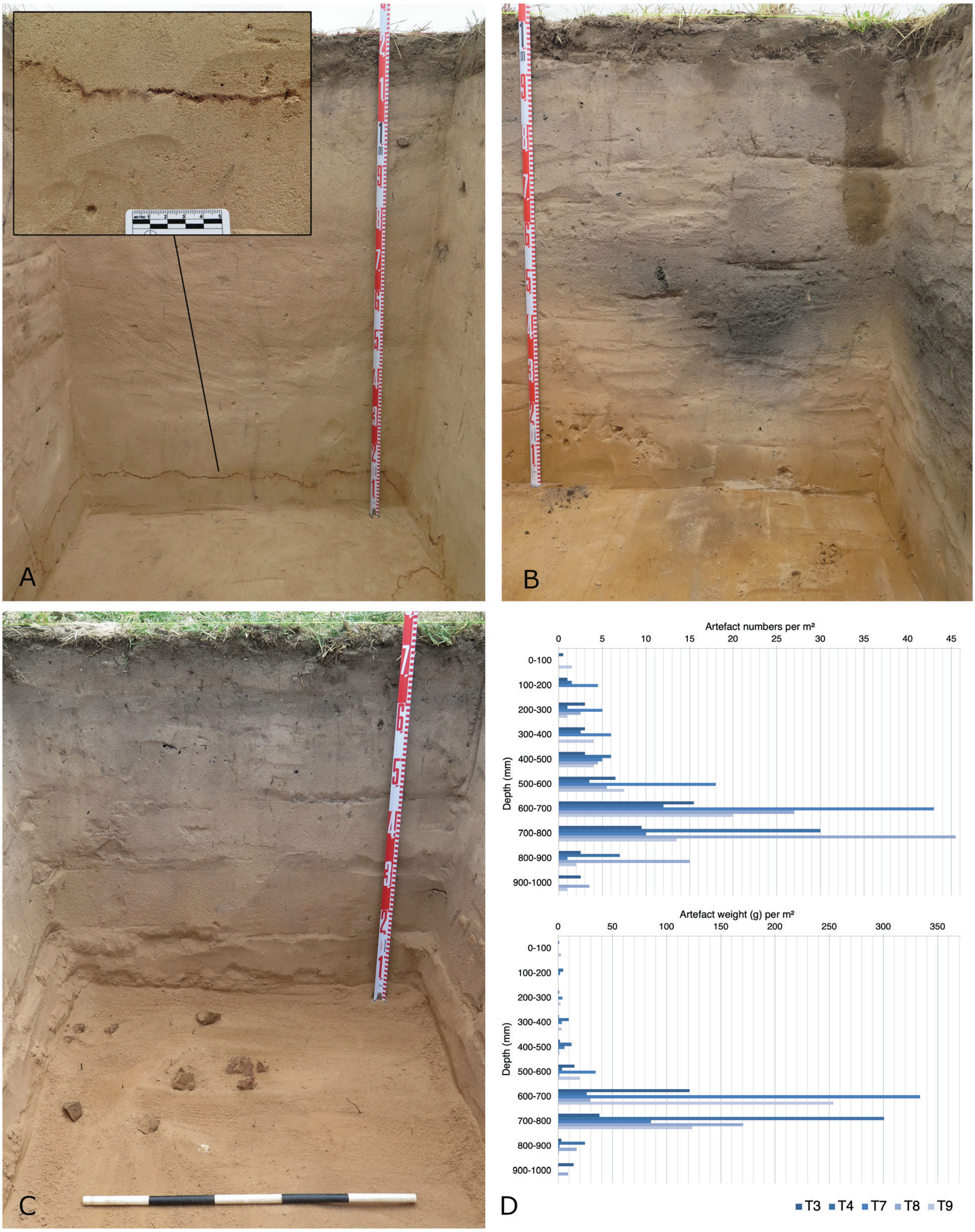

Figure 3. Profile views of excavation trenches: **A.** *T3 showing line of organic material below 1 m depth;* **B.** *Hearth in T4A;* **C.** *Deposits of stone in T9;* **D**. *artefact numbers and weights by depth in the five most productive trenches.*

Hearths

There were frequent traces of burning in the sediments at Fulham: charcoal was recovered from all of the trenches and occupation contexts in varying quantities and with differing properties. Much of this material is confidently associated with occupation by GunaiKurnai Ancestors because of its depth and proximity to artefact clusters. Accumulations of charcoal and ash in trenches T4 and T9 are identified as hearths, which is evidenced by the shape of the features in the soil profile, suggesting they were constructed by excavating a depression into the former ground surface to place foodstuffs for cooking. Below the topsoil in the west of T4A, the sand contains grey ashy patches which become darker grey from 400–500 mm depth; a distinct mass of charcoal defines the core of the feature which in section is a steep–sided, cone–shaped pit with a rounded base at 700 mm depth (**Figure 3B**). Having half–sectioned this feature, the trench was extended to the west (T4C) and the remainder of the hearth was excavated. East of this hearth, in the north wall of T4B, is a dense lens of charcoal at 450 mm depth which corresponds with the top of the hearth to the west though appears to be a separate feature. Another hearth was revealed in T9, represented by a mass of charcoal at 400–500 mm depth which has a less defined base than the hearth in T4A but is marked by ashy and charred soil to 650 mm depth at its base.

Ancient ground levels

A moderate density of lithic artefacts were found in the same horizon as the hearths, though the main artefact concentrations are at a lower depth, in a context interpreted as another, older former ground surface. Clusters of stone tools and non–modified stone were prevalent between 600–800 mm depth. Consistencies in the quantity and qualities of lithics at particular depths indicate the stratigraphic integrity of these deposits. The concentrated band of artefacts can be expressed statistically by calculating the number and weight of artefacts for each 100 mm slice within each 1 m^2 unit. Concentrations in the five most productive trenches (T2, T4, T7, T8 and T9), containing more than 15 artefacts per unit/slice, are all between 600–800 mm depth (**Figure 3D**): across the Aboriginal place these concentrations all occur within an elevational range of 25–25.5 m AHD. Even more pronounced are relative percentages of artefact weight: in T4 and T7, more than 70% of artefacts by weight are within 100 mm depth ranges.

Another indication of the secure nature of the deeper artefact deposits and their context as a former ground surface is their consistent forms and materials. In T7A, a cluster of quartz artefacts—among them a core, three scrapers and two retouched flakes—was retrieved at 700 mm depth; also from this depth in the adjacent unit T7B was a ground sandstone muller (**Figure 4A**) and beside it a large silcrete core with multiple flake scars. Another example of *in situ* artefact deposition, though from a shallower depth (400–500 mm in T4C) is a fine–grained silcrete microblade core with several flakes alongside it, some of which refit to the core (**Figure 4C**). The presence of these related artefacts indicate a specific knapping event, and thus the retention of behavioural integrity and stratigraphic integrity of the deposit (e.g. Foley et al. 2017) (**Figure 4C**).

The presence of rarer materials, especially where multiple examples of artefacts made from the same materials are in close proximity, also demonstrates a lack of post–depositional disturbance and points to the preservation of relict ground surfaces. In T8, fragments of buff–coloured flaked siltstone—a material not present in any other of the trenches—were recovered at 700 mm. In T3, a large piece of red ochre was recovered from 630 mm depth (**Figure 4B**) and from a similar depth was a piece of ironstone that appears heat affected and may have been used as a heat retainer; these come from the depth range with the highest concentration of artefacts. In T9, below the level of the hearth, an accumulation of non–modified sandstone pieces at 700 mm depth coincides with the densest artefact–bearing stratum (**Figure 3C**). Though the purpose of this non–modified stone remains unclear, its deposition is interpreted to be cultural due to its localisation, association with the flaked stone artefacts, and the lack of evidence for its formation by geogenic or paedogenic processes.

These clusters and consistencies demonstrate the preservation of ancient ground surfaces that appear unrelated to the hearths and to pre–date them. This is because they are below the hearths which must have been cut into what was then the natural ground level when they were made. Therefore, sand accumulated in the interregnum between the deposition of the artefact concentrations and the excavation of the hearths. This hints at the extended and multi–phased character of the occupation, which was proved by the results of radiocarbon dating (detailed below).

Artefacts

A total of 1,063 lithic artefacts with a combined weight of 1.73 kg were recovered from the excavations at Fulham Sands 1 (VAHR 8221–0219); the majority are flaked stone, but a small number of ground stone artefacts and manuports were also recovered. The materials and forms of artefacts present give information about the nature of occupation and the practices and connections of the GunaiKurnai Ancestors who dwelt there. The accumulation of lithics, the eclectic varieties of stone and the forms of tools produced are evidence for the mobility, intentions, skill and knowledge of these people which can be interpreted to demonstrate their engagement with the landscape (Clarkson 2008).

The assemblage is dominated by quartz and silcrete, which together make up more than 95% of the assemblage by number and 74% by weight. Quartz comprises the greatest proportion by number (77.7%) and weight (61%). Most is white stone worked from rounded pebbles probably collected from nearby rivers, with some transparent/translucent and other colours present; a piece of rose quartz, fashioned into a steep–edged scraper, may have been prized for its appearance and rarity (**Figure 4E**). Silcrete is the second most

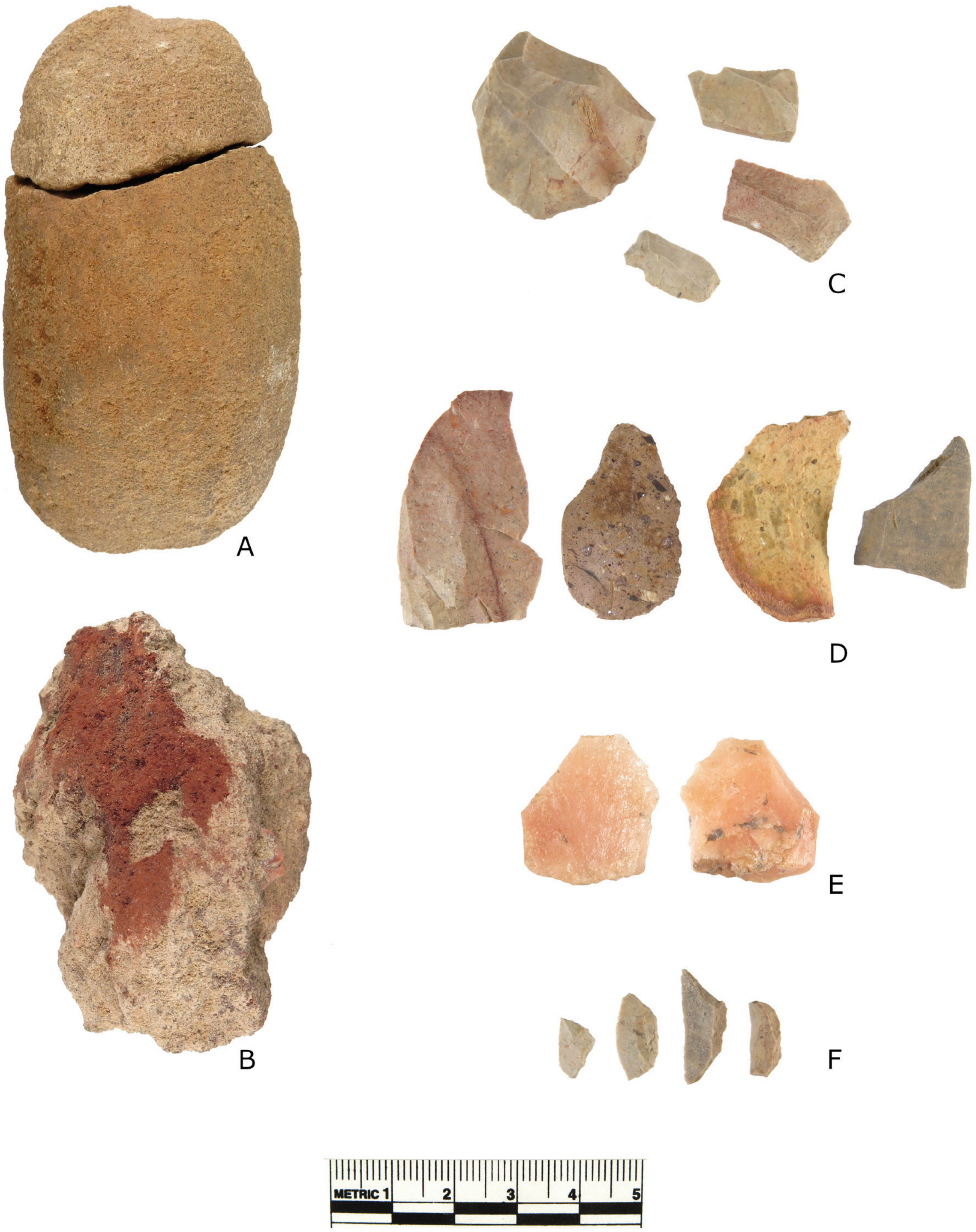

Figure 4: Artefacts from Fulham: **A.** *Ground sandstone muller from T7B;* **B.** *ochre from T3A;* **C.** *silcrete microblade core with flakes from T4C;* **D.** *varieties of silcrete;* **E.** *Rose quartz scraper from T4C;* **F.** *geometric microliths.*

common material by number (17.7%) and the third by weight (12.5%). There is substantial variation in the colour, grain size and other properties of silcretes which may have been sourced from multiple locations, though silcrete can also vary widely in colour and texture within a single outcrop (**Figure 4D**). Haunted Hills Gravel has been suggested as a potential source of silcrete in Gippsland (Wesson and Beck 1981:14,27). However, independent investigations by GunaiKurnai Land and Waters Aboriginal Corporation indicate the stone is unsuitable for use in stone tool production and that a large, fine–grained silcrete quarry at Moondarra (VAHR 8121–0261 to –0263), 55 km northwest of Fulham, bears more similarity to silcrete found in assemblages across the region (Watson 2019:51). Less common materials are quartzite, basalt and chert, as well as ochre, ironstone and sandstone sourced from multiple locations, some likely from considerable distances away.

Classified by general form, the majority of flaked artefacts are fragments (44%) and complete flakes (42%); cores make up 2% of the assemblage; the remaining 12% are broken and split flakes (Anderson et al. 2016:60–61). These proportions show a considerable quantity of debitage but broken flakes—proximal, medial, distal and split flakes—are relatively rare which may reflect the lack of post–depositional disturbance and fragmentation. A relatively large proportion of the assemblage—219 artefacts, or slightly more than 20%—have retouch and use–wear. Rarer materials have a higher rate of retouch and utilisation reflecting their suitability for producing flaked–based implements, as well as their lack of availability and thus greater reuse. Among quartz artefacts, the figure is 18% and for silcrete it is 26%. Use–wear was identified on 62 artefacts or 6% of the assemblage. Comparing the two commonest materials, 3.8% of quartz artefacts and 12.6% of silcrete artefacts have use–wear, though it should be kept in mind that use–wear is more difficult to identify on quartz, and as a more robust material, it may take more intensive usage for macroscopic use–wear to become evident.

The recurrence of certain formal tools indicates the types of implements that were fashioned, the tasks that they were put to and the intentions of their makers. Tool manufacture is evident from the attributes of deposits where a knapping event can be identified such as the abovementioned core and associated flakes in T4C. Most identified tools are scrapers of which all but two are quartz, some of which are classified as nosed, round–edged, steep–edged and thumbnail types. The majority of tools are classified as 'retouched flakes', or informal tools, though there are examples of more specifically designated tools—backed blades and geometric microliths—which are made from grey silcrete and are crescent, triangular and trapezoidal shaped (**Figure 4F**). Another silcrete tool is an elouera, a backed form characteristic of the 'Australian Small Tool Tradition' of the later Holocene (Holdaway and Stern 2004:264). The general pattern of forms in relation to materials is that most quartz tools are scrapers while silcrete tools are microliths, which may have formed part of multi–functional composite tools used for tasks such as scraping and cutting, or as barbs or tips on throwing spears (Robertson et al. 2009). This suggests the selection of different materials to make tools meant for specific tasks; furthermore, it may indicate a chronological variation in materials and forms.

Radiocarbon dating

Collected charcoal afforded an opportunity to examine the age of the deposits using radiocarbon dating. Three general varieties of charcoal were identified. Recent burning was marked by frequent charcoal within and just below the sod which likely results from fires following land clearance and farming from the mid–19th century onwards and perhaps also lower–lying material brought up from ploughing. Charcoal from Aboriginal occupation layers is distinguished by its consistency and distribution as well as its depth. The hearths in T4 and T9 consist of dense charcoal accumulations with ashy staining of the surrounding sediment; charcoal from the lower, artefact–rich strata consists of smaller, discrete chunks.

The selection of charcoal samples for radiocarbon dating analysis was informed by the project's research questions, the contextual integrity of the collection points and the aim of attaining information from different excavation trenches. Samples were prioritised that came from amongst the densest artefact deposits, from distinguishable features and from loci where contamination was deemed unlikely (all analysed samples were recovered from between 480–800mm depth below the surface). Nine charcoal samples were submitted to the University of Waikato Radiocarbon Dating Laboratory (**Table 3**). Four samples are from the artefact clusters at 600–700 mm depth in T3B–1, T7A–1, T7A–2 and T8B–1; four other samples are from the hearths in T4—three from the main hearth in the west of the trench (T4A–1, T4A–2 and T4C–1) and one from a separate charcoal cluster in the east (T4B–1); one sample is from the burned feature in T9C–1.

Eight of the samples were dated using accelerator mass spectrometry (AMS) and one using conventional radiocarbon dating. All radiocarbon dates were calibrated using the Southern Hemisphere calibration curve (SHCal20; Hogg et al. 2020) in OxCal v4.4.2 (Bronk Ramsey 1995). The nine samples returned AMS measurements (uncalibrated results) ranging from 11,144 ±48 BP to 2,030± 29 BP. Within this range

Sample code	Lab code	Weight (g)	Trench	Depth (mm)	Radiocarbon age (BP)	Calibrated age 95% probability (cal BP)
T3B–1	Wk43191	0.27	3B	600–700	10,338 ± 33	12,440–11,880
T4A–1	Wk43192	3.54	4A	620	2,049 ± 20	2,010–1,890
T4A–2	Wk43193	0.71	4A	800	2,043 ± 20	2,010–1,890
T4B–1	Wk43194	0.5	4B	700	11,144 ± 48	13,160–12,920
T4C–1	Wk43195	9.55	4C	500	2,030 ± 29	2,010–1,870
T7A–1	Wk43196	8.13	7A	500–600	9,599 ± 34	11,100–10,710
T7A–2	Wk43197	2.91	7A	600–700	9,533 ± 34	11,070–10,580
T8B–1	Wk43198	0.56	8B	700	9,441 ± 29	10,740–10,510
T9C–1	Wk43199	0.66	9C	480	2,841 ± 20	3,000–2,790

Table 3: Analysed charcoal samples and radiocarbon dating results from Fulham Sands 1 (VAHR 8221–0219).

there are two distinct phases which are separated by a period of several thousand years (**Figure 5A**). Five of the samples belong to an earlier phase (Phase 1) with uncalibrated ages of 11,144 ± 48 BP and 9,441 ± 29 BP; four of the samples belong to a later phase (Phase 2) with uncalibrated ages of 2,841 ± 20 BP and 2,030 ± 29 BP.

We conducted a Bayesian Sequence Analysis whereby radiocarbon dates are ordered on the basis of field observations. In this model we have grouped the dates into Phase 1 and Phase 2, separated by a sequential boundary representative of a time gap between the two phases (Bronk Ramsey 2009). Modelled calibrated 68% and 95% probability values are given in **Table 4** and **Figure 5B**. Modelled age ranges (95% probability) for Phase 1 show a start date of 14,670–12,890 BP and an end date of 10,730–7,520 BP; the Phase 2 start date is identified as 5,190–2,790 BP and the end date as 1,990–660 BP.

Analysis of the samples and interpretation of the radiocarbon results indicate two distinct phases, the older phase spanning at least 1,800 years and the younger having a shorter span. Remarkably, these two phases are separated by a hiatus of up to eight thousand years. We can therefore say with certainty that there are two separate occupation phases: a primary occupation phase during the Late Pleistocene–Early Holocene and a secondary occupation in the Late Holocene which may have been briefer or less intensive. All of the younger (Phase 2) dates derive from the hearths in T4 and T9, which are at shallower depths than the concentrated artefact deposits. This suggests that the primary occupation phase was a prolonged period in the Late Pleistocene–Early Holocene followed

Name	Unmodelled (cal BP)				Modelled (cal BP)			
	68% prob.		95% prob.		68% prob.		95% prob.	
	from	to	from	to	from	to	from	to
End 2					**1960**	**1560**	**1990**	**660**
Wk–43199	2950	2860	3000	2790	2950	2860	3000	2780
Wk–43195	2000	1890	2010	1870	2000	1890	2010	1880
Wk–43193	2000	1920	2010	1890	2000	1920	2010	1890
Wk–43192	2000	1920	2010	1890	2000	1920	2010	1890
Start 2					**3530**	**2860**	**5190**	**2790**
End 1					**10670**	**9660**	**10730**	**7520**
Wk–43198	10690	10570	10740	10510	10690	10580	10740	10510
Wk–43197	11070	10680	11070	10580	11070	10680	11070	10580
Wk–43196	11080	10760	11100	10710	11080	10760	11100	10710
Wk–43194	13100	12970	13160	12920	13100	12930	13160	12910
Wk–43191	12140	11940	12440	11880	12140	11930	12440	11880
Start 1					**13530**	**12960**	**14670**	**12890**

Table 4. Bayesian analysis showing unmodeled ages and modelled boundary ages ranges.

by a hiatus with a briefer occupation phase several thousand years later.

Discussion and conclusion

To the passing motorist the plain west of Sale can seem a flat and featureless tract. Yet by walking across the land subtle variations in terrain become perceptible; slight undulations and rises, areas of swamp and hollows, sandy banks and the gentle but steady slope southwards to the Latrobe River valley. The unremarkable appearance of the parched plain belies its position on an important routeway at the edge of

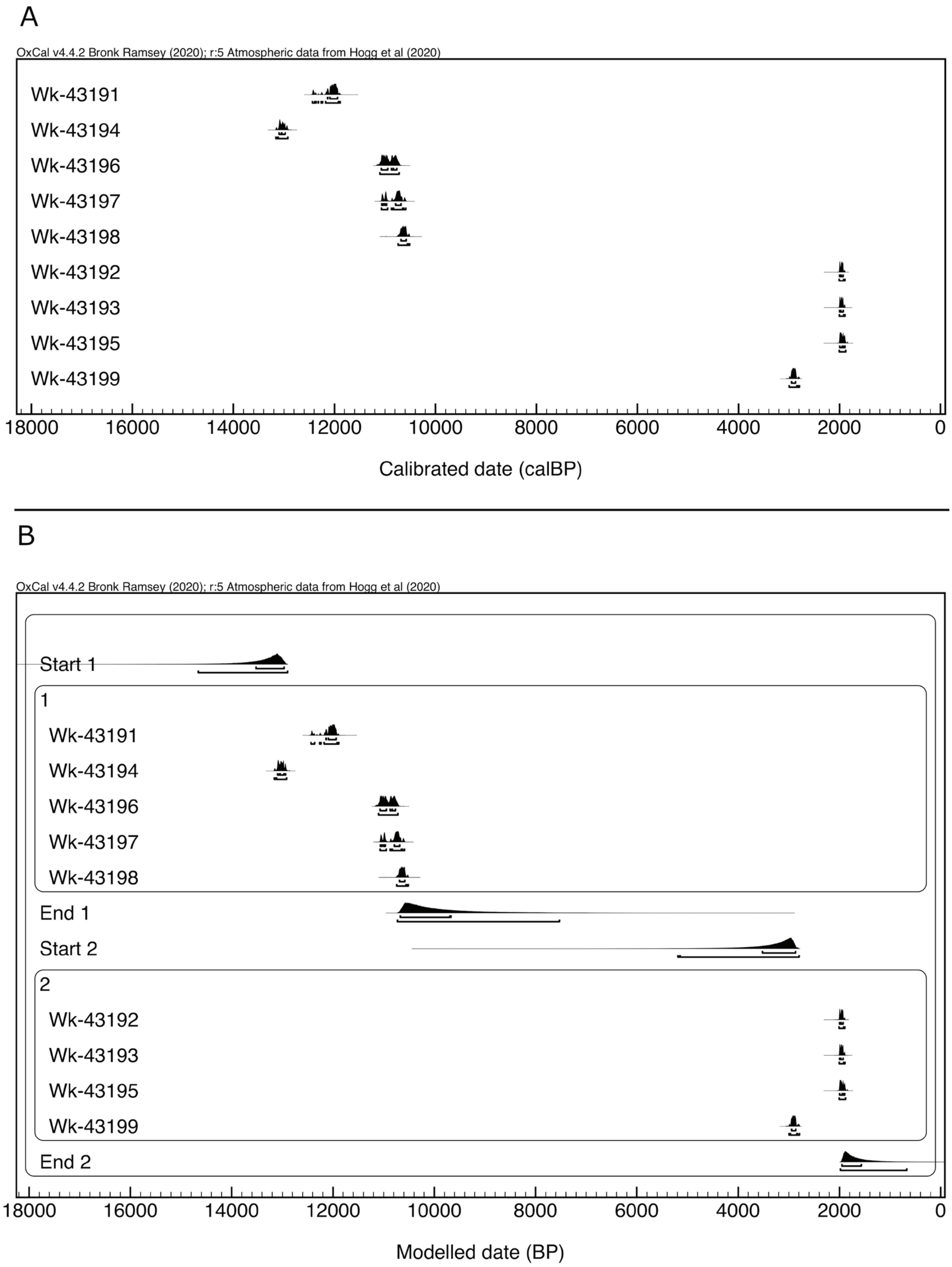

Figure 5. Radiocarbon dating analysis **A.** *Multiplot showing calibrated radiocarbon ages from Fulham excavation;* **B.** *Bayesian two phase model for Fulham excavation. Posterior probability values after the model has been applied are shown in black*

a broad estuarine landscape formed over millennia by water flows from sea and rivers.

Excavations at Fulham recorded intact cultural deposits—hearths, ancient ground surfaces and artefacts—buried deep in the sand of an alluvial rise. Radiocarbon dating identified a primary occupation phase in the Late Pleistocene–Early Holocene and a second phase in the Late Holocene. These results were unexpected. Most previously recorded Aboriginal places in the region consist of low–density and redeposited artefacts; Fulham is not within a legislated area of sensitivity for Aboriginal cultural heritage—the nearest landform designated as being sensitive is more than 2.5 km distance; the developer was not legally required to carry out any investigations and had the CHMP not been prepared voluntarily, this place would likely not have been identified. However, this place turned out to be unexpectedly rich in terms of the depth and quality of contexts, the quantity and diversity of material culture, the preservation of features and the evidence for multiple occupation phases by GunaiKurnai Ancestors.

Proving recurrent occupation over more than ten thousand years raises the question of why this landform in particular was settled at certain times and how this occupation sequence relates to its environmental context. Clues can be found in the physical geography of the locality. First is the landform itself—an alluvial rise on a curving band of Haunted Hills Gravels which is visible on the relief map (**Figure 1**). This may correspond to the prior sand barrier formed by inundation during the Late Pleistocene (Bryant and Price 1997; Bird 2010) and it is at the northernmost limit of the Latrobe River floodplain. The Princes Highway follows the slightly raised band of gravels that was a major routeway long before the road was built. The aspect from this alignment provides viewscapes to the north and south—Old GunaiKurnai Ancestors are believed to have used this path because of its natural alignment: one cannot use the river when it is in flood and it gives safe passage allowing one to see where others are by smoke from their camp fires.

Second is a kidney–shaped depression at Kilmany Park, 2 km southeast of Fulham between Wurruk and Pearsondale, which is a former estuary that developed under tidal influence at times of high water levels; later alluvial infilling then reclaimed the flooded valley and formed extensive plains (Jenkin 1968:72–75). Rising water levels in the Early Holocene covered over large tracts of formerly productive plains which potentially caused population dispersal and displacement (Canning 2009:10–11). Conceivably the earlier GunaiKurnai Ancestors who inhabited this place would have overlooked the watery landscape of a broad coastal estuary, surrounded by streams and swamps, which was later inundated. This may explain the organic 'tideline' in the sands directly beneath the basal occupation layer as the 'formation of organic material beneath seasonally decaying swamp and brushwood peat beneath the swamp scrub' that accompanied the deposition of silt (Bird 2010:1389).

Where today we see dry paddocks distant from rivers and coastline, GunaiKurnai Ancestors here would have been at the fringe of swamps and lagoons. The lower reaches of the Thomson and Latrobe Rivers thus had a far wider cultural catchment than the floodplains of the present–day watercourses. These riverine and estuarine plains had a crucial connecting role in people's movement, providing linkages between the high country to the north and the coast to the south. Connections may be drawn with the occupation of caves in the high country along the middle reaches of these same rivers. This shows the entanglement of physical and cultural aspects of the river system and demonstrates the linkage of geographic features with social groupings in Aboriginal society (Morphy 1995). Further, the extended occupation at Fulham shows connections across vast timespans through episodic use of the same landform, raising the possibility of encounters with the debris of earlier occupants in a recurrence of dwelling and cultural production.

Fulham is identified as a place of recurrent dwelling by GunaiKurnai Ancestors whose usage fluctuated over several millennia. Its importance was as an alluvial island beside a wide and productive estuary, which in later times shrank as water levels dropped. This was surely an optimal position for hunting and movement along the fringe of the floodplain; the diversity of stone artefacts shows that the people here could source a variety of materials which indicates their connectivity beyond the coastal zone. This has wider implications for understanding Aboriginal peoples' connections with waterways and their surroundings. We cannot recover through archaeology the non–material acts—the stories, songs, ceremonies and rites that may have been associated with this place. However, making plausible recreations of the settings in which these acts took place highlights the importance of riverine landscapes as an essential part of Aboriginal lifeways and thought.

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