A late-Holocene Aboriginal hearth from Point Nepean, Victoria, Australia: Maximising insights from minimal impacts

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Abstract

The discovery of a well-preserved hearth at Point Nepean presented an opportunity to extract as much information as possible from an unusual feature in the Metropolitan region which includes in situ heat-retaining stones. Working in conjunction with the Traditional Owners and Parks Victoria, slumped hearth and midden deposits were excavated carefully, and samples sent to specialists for analysis. The remainder of the intact feature was photographed in 3D and then preserved by the construction of a rock-retaining wall by Parks Victoria. The results of the scientific analyses have yielded insights into the activities that took place in the vicinity of the hearth around the time of first contact between Aboriginal and European people, and illustrate the potential for similar studies to be undertaken on comparable deposits at other Aboriginal places.

Introduction

One of the main purposes of the Aboriginal Heritage Act 2006 is to provide for the protection of Aboriginal cultural heritage, including intangible heritage, in Victoria (AHA 2006:1). Sea-level changes associated with global warming and erosion pose a threat to hundreds of registered Aboriginal places along the Victorian coastline (McAlister 2013; Rhodes et al. 2012:237–242). Although sheltered from the ocean, the coastline of Port Phillip Bay is at risk from storm events and increased swells from dredging and the passage of large container ships. In October 2015, Parks Victoria (PV) rangers noticed a small area of dune collapse to the southeast of the Point Nepean Quarantine Station. The erosion had exposed a thin lens of midden deposits. The hearth feature is unusual in the Metropolitan region as it includes in situ heat-retaining stones. Discussions between PV, Traditional Owners (TOs) and Aboriginal Victoria (AV) resulted in agreement that the discovery presented an opportunity to preserve what was left of the hearth in situ, and to extract as much information as possible about the hearth from the collapsed deposits which lay slumped at the base of the eroding dune face.

Location and context (Turnbull and Thomas)

The hearth is located in Point Nepean National Park, 90 km south of Melbourne, at the tip of the Mornington Peninsula. LiDAR data have been utilised to illustrate the relief of the wider region. The hearth, registered as an 'Earth Feature' on the Victorian Aboriginal Heritage Register, is located on the sheltered, low-lying plain on the bay side of the peninsula (Figure 1). Point Nepean is an area of great natural beauty, with outstanding coastal scenery and panoramic views of Bass Strait, the Rip and Port Phillip Bay. The diverse landscape includes a wide variety of natural resources, which explains in part why Aboriginal people have been attracted to the area for so long. During the early colonial period, William Thomas (cited in Sullivan 1981:25) noted that Aboriginal women in Melbourne “... would go three times a week to gather mussels from near the spot where the emigrants were about to perform quarantine”. This place, however, was more than a source of food — as Dan Turnbull (pers. comm. 2017), of the Bunurong Land Council Aboriginal Corporation (BLCAC), puts it:

“Our Ancestors called this place Monmar. It has always been a sacred place and it always will be. It is one of the most sacred sites on the Peninsula, the traditional lands of the Burin’yong Bulluk, a clan of the Bunurong/Boon Wurrung.

Oral histories recount that the Boonwurrung people (represented today by the Boon Wurrung Foundation Limited and the BLCAC) have met at Wonga (Arthurs Seat) for thousands of years. The men would head to Cape Schanck, and the women to Monnar. Although Monnar is not exclusively a women’s site, it is now predominantly known as a special women’s place for birthing, women’s
ceremony and initiation of the younger women.

The area also has a brutal colonial-period history; many of the Boonwurrung community today are direct descendants of women taken against their will from the beaches of Point Nepean by sealers (see Fels 2011:325ff). On one occasion, six or more women (including young girls) and a boy were abducted. Several of the women were prominent within the community, being the wives of Boonwurrung head clansmen Derrimut, Big Benbow, Betbenjee and Budgery Tom. They included Nan.der. goroke, Nay.nar.gorote, Nan.nat.goorku, Nan.nert. goroke, Kar.ding.goroke, Tout.kun.in.grook, Doog.by.er. um.boroke and Toolom. It is an incredibly powerful and emotional experience for Boonwurrung people today to visit the area from which these women were taken:

*We can stand in the same water with our feet in the same sand and hear what they heard. We enjoy the natural sounds of the place and the chance to acknowledge the past respectfully and to walk where our ancestors walked* (Dan Turnbull pers. comm. 2016).

The whole region, from Point Nepean to the Sisters, and from Arthurs Seat to Cape Schanck, is connected by a thousand-generation’s worth of tradition, story and song. One old mythology story speaks of the Mindie, a menacing creator spirit who came across the heads and onto the Peninsula during a terrible storm in the form of a whirlwind or willy-willy. The Mindie travelled angrily up the Peninsula, shaping the dune systems as it went. Water then filled the low points, creating the waterholes that were so important to life in this area.

Other ‘creation/Dreamtime’ stories around the continent correlate well with scientific evidence for sea-level changes, and illustrate the richness and antiquity of Aboriginal Australians’ living oral histories (see Holdgate et al. 2011:157, and Nunn and Reid 2016:8–19, in particular). The Port Phillip Bay coastline contains numerous shell middens, some dating back to shortly after the ocean breached the blockages at what is now the mouth of the Bay, around 7,217 cal. BP (Holdgate et al. 2011:174).

The tangible archaeological record of Aboriginal occupation in the area is abundant. Over one hundred Aboriginal places are registered at Point Nepean, 86% of which are shell middens. The most extensive subsurface testing has been conducted at the former Quarantine Station, just to the east of VAHR 7821-0926, where 47 1x1m test pits revealed an extensive, but generally thin and patchy, series of shell midden deposits and stone artefact scatters across the flat coastal plain and flatter areas above the high cliffs (VAHR 7821-0717; Williamson 2008, 2014). No formal hearths were identified during these excavations, although a concentration of charcoal and burnt limestone was noted in one test pit, yielding a radiocarbon age estimate of 2,150-2,000 cal. BP (Williamson 2014:26–36). It is also worth noting that a “… concentration of fire-affected rocks, covering an area of about 1.8 square metres” was noted nearby during a survey 25 years ago, but no further details were recorded (Craib 1989:10).

The shell assemblage from Williamson’s excavations at VAHR 7821-0717 is almost completely made up of...
limpet (*Cellana* sp.; 45% of the MNI), warrener (*Turbo* sp.; 23% of the MNI) — although most of the opercula are probably derived from warrener (Williamson 2014:253). A total of 410 stone artefacts were also recovered. Over half the artefacts were manufactured on silcrete and a significant proportion were made on hornfels and quartz. The raw materials were thought to have been imported as there are no sources on the heritage register for Point Nepean. Boonwurrung tradition, however, refers to a source of red stone below the long-since submerged waterfall at the heads of Port Phillip Bay. The stone is sacred to the Boonwurrung people, who traditionally believed it was the solidified remains of an ancient creator spirit, and quarried it for ceremonial purposes. The generally small artefact sizes suggest intensive working and curation of the lithics. A total of 11 cores were present, in addition to tools that include three scrapers (interpreted as implements for woodworking and animal-hide preparation) and 12 microliths (Williamson 2014:256–259).

A total of 31 radiocarbon age estimates have been attained from VAHR 7821-0717. Age estimates for the flat coastal plain go back to approximately 6,000 years BP, corresponding roughly with the time that the sea reached its present level. OSL age estimates between ~20,000–10,000 years BP were obtained from artefact-bearing sediments situated above the high coastal cliffs (Williamson 2014:261). The Pleistocene age estimates and lack of shell from this elevated location suggest that it was occupied when the sea-level was significantly lower than its present levels, and the Boonwurrung people would have looked out over what was then a grassy plain with the Yarra River winding its way out to the ocean over a waterfall at the heads.

**Digital recording and salvage excavation (Thomas and Phillips)**

PV proposed to construct a rock revetment wall at the base of the hearth to protect it from further erosion. Consequently, the project aimed to document as much about this Aboriginal place as possible before the hearth became inaccessible. The proposed rock wall would have a significant visual impact on the dune, so an additional aim of the project was to use digital photography to preserve a 3D record of this place (Figure 2). Almeida and Lovett (2016) have recently applied this approach with great success elsewhere in Victoria. This also presented the opportunity to test whether creating a 3D digital photographic record of the place would facilitate the fieldwork-documentation process by generating scalable models of the place.

The approach and methods of the salvage excavation were devised and implemented with the agreement of the TOs, who permitted the collection and removal of Aboriginal cultural heritage for analysis. Three trenches were excavated manually with the aim of investigating the collapsed deposits at the base of the hearth, and checking that no other cultural material would be impacted by the construction of the rock wall. The trenches were excavated using trowels and hand shovels to either the maximum depth of impact, or to a sterile context. All excavated deposits were sieved through 4 mm mesh sieves.

![Figure 2: 3D photo montage of the hearth site (photographs by David Thomas, 3D model by Matt Carter (La Trobe University)).](image-url)
One 1x1 m test pit (PN1) was excavated at the base of the hearth to sample the collapsed material from the hearth and midden. A 200–400 mm baulk was left at the base of the midden section so as not to undermine the stability of the midden (Figure 3). It soon became clear that the collapsed deposits had actually slumped down as a coherent block, due to undercutting of the dune face. Consequently, the deposits retained stratigraphic integrity, and could be excavated by contexts that could be correlated with those visible in section above (Figure 4; Table 1). As Ward and colleagues (2016:1) argue, excavating by meaningful contexts rather than arbitrary spits is preferable because “... it provides a more precise understanding of the original depositional context and what that might tell us about past environment and past human behaviour”.

The trench contained six hearth stones, all identified in Context 3. The stones were generally lying flat but in no obvious arrangement. One limpet shell was located underneath a hearth stone, but, otherwise, this trench contained few finds (see below). Charcoal samples obtained from PN1 Context 3 returned a conventional radiocarbon age estimate of 210±30 BP (Beta 440784), calibrated using OxCal 4.2 to fall within the ranges 1646 to 1684 CE (29.6% probability) and 1737 to 1807 CE (48.5% probability) (Figure 5). Despite the media’s obsession with the ‘oldest’ archaeological discoveries (Richards 2004:52), this relatively recent age estimate carries extra significance for the TOs because of the kidnapping of their ancestors around this time.

A 0.5x0.5 m test pit (PN2) was excavated approximately 1 m to the northeast of PN1 (Figure 3), with the aim of collecting a representative sample of shells from the midden (shells were more numerous in section to the east of the hearth). Shells were visible on the surface of the test pit, but did not continue deeper

Figure 3: Plan of dune and hearth, showing locations of excavated trenches.

Figure 4: Photo of in situ hearth (background) and slumped deposits at its foot (foreground), illustrating the stratigraphic integrity of the excavated slumped deposits (photograph by David Thomas).
Table 1: Context observations for test pit PN1.

<table>
<thead>
<tr>
<th>Context and depth</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: 0–250 mm</td>
<td>Light grey/white sand including roots and snail shells. Topsoil. No finds.</td>
</tr>
<tr>
<td>2: 250–300 mm</td>
<td>Light brown fine sand. Fine roots. No finds.</td>
</tr>
<tr>
<td>3: 300–500 mm</td>
<td>Light grey sand. Large charcoal fragments. Hearth material.</td>
</tr>
<tr>
<td>4: 500–600 mm</td>
<td>Light grey sand and natural yellow beach sand. Interface between base of hearth collapse (C 3) and natural sand. Glass fragment.</td>
</tr>
</tbody>
</table>

Figure 5: Radiocarbon calibration curve for Sample Beta 440784.

The collapsed deposits in PN2 appear to have less stratigraphic integrity than those in PN1 — metal and glass fragments were more common in this area, and the contexts were harder to differentiate.

The final test pit (Wall Trench (WT)) measured 1x1 m, and was excavated on the alignment of the proposed rock revetment wall to the depth of the proposed impact (~0.5 m). As expected, no Aboriginal cultural heritage material was identified in this trench. The deposits in WT were affected by natural processes; roots and grubs were present throughout, and polystyrene was observed at depths between 300–400 mm.

Use-wear and residue analyses (Stephenson)

Two of the burnt hearth stones from PN 1 Context 3 were selected as the most promising for use-wear and residue analyses (Stone #0422, Stone #0407; Figure 6).

Use-wear refers to modifications on the working edges and surfaces of an artefact due to friction between the worked material and the tool (Kononenko 2011:7). Characteristic wear patterns, some identified during controlled experimental studies, can be utilised to infer tool function, the context of use, and the types of materials processed (Dubreuil 2001, 2004; Fullagar 2006; Kamminga 1982). The most common patterns of use-wear include striations, surface polish, edge rounding, scarring and microfractures (Kamminga 1982:4). However, Robertson (2009:243) notes that wear features may not always relate to use, but, instead, may result from post-depositional processes. Therefore, when use-wear is viewed in isolation, the potential exists for misattribution of the wear patterns to cultural causes, thereby highlighting the need to integrate multiple lines of use-wear and residue evidence (Lombard and Wadley 2007; Robertson et al. 2009).

Although residue-preservation mechanisms are unclear (Langejans 2010:971), residues can survive and...
adhere to stone tools for prolonged periods of time (Briuer 1976; Fullagar and Field 1997; Hamm et al. 2016; Loy and Hardy 1992; Nowell et al. 2016). Residue analysis involves the microscopic identification of surviving residues which commonly include plant (e.g. starch, raphides, phytoliths, pollen), animal (e.g. blood, bone, hair, collagen), and inorganic (e.g. ochre, resin) matter. However, as some residues may be associated with environmental influences, rather than use, controls are an essential component of residue studies (Haslam 2009:136). Similarly, weathering can distort or remove residues, and poor preservation conditions can markedly bias the quantity and type of residues preserved (Briuer 1976:482).

The general aims and methods of the use-wear and residue analyses were to:

• Conduct low-powered microscopic use-wear studies across two of the hearth stones;
• Perform ultra-purified water lifts to extract samples from the surfaces of the stones;
• Prepare control samples using adhering debris from the two stones;
• Prepare the extracted samples for microscopic investigation using specifically developed biochemical-staining approaches; and
• Employ high-powered microscopy to examine stained samples to identify microfossils (e.g. starch), animal residues (e.g. collagen, bone) and other traces (e.g. ochre).

To overcome the limitations associated with previous hearth-stone studies, and studies of ground or pounding surfaces (see Balme et al. 2001; Stephenson 2011), adapted biochemical-staining approaches were integrated with conventional microscopic methods. This approach assists with the visualisation of residues that have been altered by the forces of pounding and heat, without affecting the microscopically visible features or behaviours of the residues.

The matrices and voids of stone surfaces, particularly grindstones, pounders and hearth stones, provide an ideal environment for the trapping of residues (Buonasera 2005, 2016; Field et al. 2009:228; Quigg 2003:16). For this study, 11 lifts (samples) were taken to extract residues from the matrix of surfaces of the two hearth stones: three from Stone #0422; and eight from Stone #0407. To confirm that residues were use-related, two slides were prepared from debris (i.e. vegetation, sandy soil) that had adhered to the stones when they were excavated. These control slides allowed for a comparison of residue densities. It is assumed that, if the densities of similar residues are higher across the area of interest on the surface lift, then these residues are use-related because they are not naturally occurring in these densities in the surrounding deposits.

Utilising protocols developed specifically by In the Groove Analysis (ITGA), the slides were stained with a 0.25% solution of Picro-sirius Red (PSR) and Weisner reagent. Biochemical staining relies on colorimetric changes, rather than structural features, and is therefore not dependent on residue structure being pristine or intact for identification (Stephenson 2011, 2015). Picro-sirius Red is a collagen-specific stain which facilitates differentiation between plant and animal residues. The Weisner reagent, or acidified Phloroglucinol, is used to identify lignin by turning lignified tissue into a characteristic cherry red or red-violet colour (Briuer 1976:482; Stephenson 2015).

**Stone #0407**

Stone #0407 is an elongated, black-grey, oval-shaped stone measuring approximately 150x60x20 mm (Figure 6). The raw material type appears to be limestone, with a tightly compacted and well-cemented matrix. Weathering was noted across all surfaces as depressions and pits. The surface is covered in a black biofilm, which is indicative of burning (Stephenson 2016). Detailed analysis of Stone #0407 found:

<table>
<thead>
<tr>
<th>Stone</th>
<th>Area</th>
<th>Reason for selection</th>
<th>Primary residues</th>
</tr>
</thead>
<tbody>
<tr>
<td>#0407</td>
<td>1</td>
<td>Discrete residue film noted around individual matrix grains and within the matrix</td>
<td>Collagen, bone and fat</td>
</tr>
<tr>
<td>#0407</td>
<td>2</td>
<td>Glossy area</td>
<td>Lipid smear, fish bone</td>
</tr>
<tr>
<td>#0407</td>
<td>3</td>
<td>Dense carbonised residue film</td>
<td>Reticular collagen, carbonised material, bone</td>
</tr>
<tr>
<td>#0407</td>
<td>4</td>
<td>Dense carbonised residue film</td>
<td>Collagen structure, carbonised materials</td>
</tr>
<tr>
<td>#0407</td>
<td>5</td>
<td>Lipid-like residue and gloss</td>
<td>Bone collagen, lipid smear</td>
</tr>
<tr>
<td>#0407</td>
<td>6</td>
<td>Moderately dense carbonised film</td>
<td>Carbonised materials</td>
</tr>
<tr>
<td>#0407</td>
<td>7</td>
<td>Gloss within and surrounding a weathered area</td>
<td>Lipid structure, charred cells, lipid smear, bone, shell</td>
</tr>
<tr>
<td>#0407</td>
<td>8</td>
<td>Carbonised film at the base of a weathered area</td>
<td>Bone, collagen, carbonised material</td>
</tr>
<tr>
<td>#0422</td>
<td>1</td>
<td>Fractured base</td>
<td>None</td>
</tr>
<tr>
<td>#0422</td>
<td>2</td>
<td>Fractured base</td>
<td>None</td>
</tr>
<tr>
<td>#0422</td>
<td>3</td>
<td>Weathered area</td>
<td>None</td>
</tr>
</tbody>
</table>

Table 2: Extraction area, reason for selection and primary residues noted for stones #0407 and #0422.
#0407 identified a lack of use-wear modifications. This indicates that this item is a natural piece of stone that has not been modified purposely, and does not display any evidence for use prior to being utilised as a hearth stone.

Nonetheless, a wide range of residues were noted on the surfaces of this item, including plant material, collagenous material, bone, lipid, fatty structures, shell, minerals and carbonised material (Table 2–Table 3). Residue-density comparisons with the control slide showed that the densities of plant fibres and minerals were similar, indicating that these residues are unlikely to be use-related, and are more likely to relate to environmental factors (Stephenson 2016). The plant fibres were relatively large, and often loosely bound in bundles. The thickness, bundled appearance and relative intactness suggest that the fibres had not been processed. This interpretation was supported by the absence of charring that would generally be associated with hearth activities. Mineral densities were similar across all lifts and the control sample. The combination of minerals present was also comparable. The minerals were intact, and did not display any damage that is normally associated with processing events, such as pounding, grinding or scraping.

A variety of collagenous residues were noted in varying densities across seven of the lifts (Figure 7).
These residues included amorphous collagen, collagen fibres, folded collagen, reticular collagen and collagenous structures. Collagen was absent across the control sample, indicating that the collagen identified is likely to be use-related. Furthermore, collagen observations were accompanied frequently by bone fragments, fatty structures and lipid smears (Stephenson 2016). These combinations would be expected for animal- and fish-processing events, which may include preparation, cleaning, gutting and cooking. The majority of the bone fragments were accompanied by carbonised residues. Not all of the bone recorded was burnt, indicating that some bone may have been discarded into a cool or cold hearth. Possible fish bone was noted across Lift 7. Fish bone is distinct as it is less mineralised than animal bone, it possesses discrete tissue zones, and it is irregular in terms of its morphology. Unlike mammals, birds, amphibians and reptiles, fish bone is composed of cells that do not contain osteocytes (Cohen et al. 2012).

Carbonised residues accompanied the observed instances of collagen. While all collagen appears pink in plane-polarised light, larger collagen fibres were bright orange or yellow, and thinner fibres (including reticular fibres) were green, when viewed in cross-polarised light. Reticular fibres are commonly found in connective tissue associated with bone marrow, and were noted particularly across Lifts 3 and 5. Collagenous structures were also noted across Lift 4, which was from the same carbonised area of interest as Lift 3. The combination and density of these residues (including carbonised remains) suggest that food was placed directly on the hearth stone to roast or cook (Stephenson 2016).

Shell was also associated with collagenous residues and lipids across Lift 7. Unburnt and partially burnt shell were noted, indicating that their inclusion in the hearth may have occurred when the hearth was cooler. However, the density of shell was low. While this may indicate that large quantities of shell material were not cooked or consumed beside the hearth, it may also reflect the small size of the sample extracted (Stephenson 2016).

Fatty structures and lipid smears were noted across Lifts 5 and 7. These areas of interest were triggered by a lipid-like biofilm and gloss, respectively. Burnt or carbonised cells were identified in the fatty structures. Fatty acids subjected to heat become highly oxidised (Buonasera 2016) and, in this form, they present as lipid smears (often seen on the base of frying pans). While fatty acids are present in animals, fish and plants, their presence in combination with collagen, bone and shell suggests that the lipids noted were the result of animal- or fish-processing or cooking events. While use-wear indicative of processing was not noted across Stone #0407, it would be useful to examine other lithic material found in the vicinity of the hearth for evidence of use-wear relating to the preparation or processing of meat or fish.

Carbonised residues were found in similar densities across both faces of the hearth stone, indicating that they were subjected to similar volumes of heat. Likewise, residues were identified across both faces. This indicates that hearth material remains filtered through both sides of the stone, and/or food was placed on the stone (and the stone was turned at some point). The Weisner reaction was negative, indicating the absence of lignified tissue such as wood. This is not unexpected, as it is likely that any wood present originally would have been carbonised.

The residues, particularly the high densities and combinations of collagen, indicate that the hearth feature containing Stone #0407 was used to cook collagenous material which may have included animal and fish. It is also possible that shell was prepared close to, or cooked in, the hearth. The observed triggers for the lifts or extractions were in broad agreement with the types of residues identified (i.e. gloss, lipid; Table 2).

**Stone #0422**

Stone #0422 is an L-shaped block of sandstone (Figure 6). The matrix grains are weakly cemented by quartz and silica. The base of the stone is approximately 100x30 mm in size, and the L-shaped arm is 60 mm in length. The stone was selected for analysis as it was observed to fit neatly in the hand, suggesting that it was used as a tool — possibly to knock shellfish from rocks. However, the extremely friable nature of the stone is likely to have limited its usefulness, highlighting the value of a geological assessment of such samples prior to their selection for detailed analysis. Macroscopically, there is no evidence to suggest that the stone was modified; polish and striations are absent from all surfaces, and crushed shell is notably absent. The use-wear observations indicate that Stone #0422 is a natural stone that was not modified purposely, and this item does not present any evidence for use (Stephenson 2016).
A variety of residues were noted on the surface of the stone, including plant fibres, amorphous cellulose, lichen, carbonised material and minerals. However, the densities of all residues were similar across the control slide, indicating that the residues are unlikely to be use-related, and most probably relate to environmental factors. These results are in agreement with those generated from the use-wear analysis, which indicate that Stone #0422 is a natural and non-modified stone that was not used for processing activities such as the pounding of limpets, or the crushing of shells (Stephenson 2016). Interstitial spaces were generally empty. The stone's black/grey biofilm is probably the result of burning. Natural weathering was recorded across the different surfaces of the stone. The absence of use-related hearth residues may relate to the distance of Stone #0422 from the active hearth, or indicate that it was only exposed to the hearth for a short period of time.

**Anthracological analysis (Carah)**

Anthracology, or wood charcoal analysis, is the taxonomic identification of charcoal fragments (>2 mm) through the examination and description of their anatomy (Asouti and Austin 2005). An anthracological analysis can therefore be used to examine the anthropogenic use of wood as fuel and fibre, and to reconstruct local environments.

The Point Nepean anthracology assemblage was derived from three distinct contexts (Table 4). The analysis was supported by the collection and curation of an extensive wood reference collection, which was generously provided by staff from PV. All of the charcoal available from each context was analysed, comprising up to 50 fragments of wood charcoal. The section of the hearth, and associated sediment above (PN1 Context 2) and below (PN1 Context 4), was identified as Allocasuarina sp. (droopy sheoak) — except for one unidentified species (Type 6), and a fragment of monocotyledonous stem tissue. The uniform nature of the assemblage suggests that this hearth, and its associated sediments, probably represent a single or short use, with the fire constructed from locally available wood (Allocasuarina sp.). Droopy sheoak is particularly suitable to use as firewood for campfires as it is slow-burning and gives off good heat (Matt Mooney, pers. comm. 2017).

Compositionally, WT was very similar to PN1 contexts 2–4, in that it only contained Allocasuarina sp. wood charcoal. This may indicate that the charcoal identified in WT was derived from the hearth in PN1, or Allocasuarina sp. charcoal (anthropogenic or natural), and was redeposited in this location.

PN2 is the most taxonomically diverse of all of the Point Nepean contexts. It contains Allocasuarina sp. and Leptospermum sp. (coastal tea-tree) wood charcoal, as well as two unidentified species (Type 7 and Type 9). PN2 is dominated by Type 7 charcoal (51% of identified specimens). Both Allocasuarina sp. and Leptospermum sp. are from the coastal dune scrub vegetation community, which probably grew near the site. The higher taxon richness in this context may indicate that this deposit is mixed, and is therefore more of a composite sample of charcoal, as suggested by the other archaeological data.

Unsurprisingly, the results of the anthracological analysis demonstrate that the fuel wood used in the PN1 hearth was selected from the coastal dune scrub vegetation community, which would have been available locally. The exclusive occurrence of Allocasuarina sp. wood charcoal in the hearth suggests that Aboriginal people deliberately chose this species from the variety of options available due to its suitable properties for use as firewood.

<table>
<thead>
<tr>
<th>Species</th>
<th>PN1 (Context 3 — hearth)</th>
<th>PN1 (Context 2)</th>
<th>PN1 (Context 4)</th>
<th>Wall Trench</th>
<th>PN2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocasuarina sp.</td>
<td>26</td>
<td>45</td>
<td>33</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>cf. Allocasuarina sp.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptospermum sp.</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Monocotyledon stem</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 6</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 7</td>
<td></td>
<td></td>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Type 9</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Indeterminate</td>
<td>17</td>
<td>11</td>
<td>4</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44</td>
<td>12</td>
<td>50</td>
<td>55</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 4: Point Nepean anthracological assemblage.
Shell material and other finds (Phillips and Thomas)

The number of shell specimens recovered from the salvage excavation is too small to warrant detailed analysis. Only 72 complete shells were identified in PN1 and PN2; 15 of these are limpet shells, and most of the remaining pieces are tiny conical shells whose nutritional value should not be discounted due to size alone (Garvey 2017:98–99).

The majority of the 206 shell fragments recovered are too fragmentary for identification; 10% represent Turbo sp., and a smaller percentage are limpet fragments. The limited amount of data available makes it difficult to assess the importance of shellfish in the food prepared around the hearth.

A small number of colonial finds were also recovered. The majority of these were tin can fragments from PN2. The deteriorated condition of these fragments precluded the identification of the type, or types, of tin can represented. The presence of these finds in the upper and mixed contexts of the salvage trenches is unsurprising, given the occurrence of historical rubbish dumps in the vicinity of the Quarantine Station.

Protection works (Coombes)

Due to the level of significance of the hearth, and the potential for it to sustain further damage during King-Tide events, PV realised that the effort required to protect this feature would be substantial.

The final engineering solution involved the construction of a rock-revetment wall that was 10 m long and approximately 2 m high, with approximately 700 mm of its height obscured below the surface. The subsurface component comprised a base using approximately 20 anchor rocks, with each rock weighing up to 1.5 tonnes.

The revetment wall was built up from the base using smaller rocks weighing between 200–400 kg. Brown granite was the material of choice for the wall due to its superior quality and durability, and it was purchased from the Hillview Quarry located nearby in Dromana. The combination of the construction method, material type and contractor employed had proven to be successful at several other locations nearby — particularly for the stabilisation of a section of coastal embankment below private residences adjacent to the nearby Collins Settlement site.

Discussion and conclusions

The combined efforts of PV, AV, the TOs and external specialists have resulted in the extraction of the maximum amount of information from the exposed hearth at Point Nepean with the minimum amount of impact. More importantly, the in situ remains of this Aboriginal place have been preserved, both physically and digitally. The radiocarbon age estimate places the use of the hearth around the time of the first brutal contacts between British colonists and sealers, and local Aboriginal TOs.

Our scientific analyses have yielded robust insights into some of the diet and firewood-foraging strategies that were used at the time. Meat (and possibly fish) were cooked over a campfire on the Point Nepean foreshore over one hundred years ago. The campers exclusively selected droopy sheoak (Allocasuarina sp.) as fuel wood for their fire, which reached temperatures of over 500°C. The campfire was probably only used once.

The results generated from the residue analysis indicate that the incorporation of the additional biochemical-staining approaches allows for previously unidentified or overlooked residues to be recognised. The detection of these residues has resulted in the identification of a wider range of past human activities. This form of analysis is scientifically sound, relatively inexpensive and non-destructive.

It is hoped that the dissemination of these results will facilitate and stimulate further discussions about pertinent research issues, and promote the value of continued information collection and sharing between all stakeholders. The merits of adopting similar, rigorous scientific studies of comparable deposits and artefacts across the Aboriginal heritage management industry are clear.

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References

Aboriginal Heritage Act (AHA) 2006 (Vic.).

Almeida, F. and T. Lovett 2016 At the distance a snapshot (well, maybe more than one): Affordable 3D modelling of Aboriginal cultural heritage through photogrammetry. In C. Spry, E. Foley, D. Frankel, S. Lawrence, I. Berelow and S. Canning (eds), Excavations, Surveys and Heritage Management in Victoria, Volume 5, pp. 35–45. Melbourne: La Trobe University.


Balme, J., G. Garbin, and R. Gould 2001 Residue
analysis and palaeodiet in arid Australia. *Australian Archaeology* 53:1–6.


Nunn PD. and N.J. Reid 2016 Aboriginal memories of inundation of the Australian coast dating from more than 7000 years ago. *Australian Geographer* 47(1):11–47.


Rhodes, D., L. Prossor, R. McAlister and K. Audy 2012


