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**"Should we have Beethoven's Moonlight Sonata ... or a hot dinner?"
Resource stress as an alternative to the abandonment of Peel Town, Swan
River Colony, 1829-1830**

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Title

“Should we have Beethoven’s Moonlight Sonata...or a hot dinner?”: Resource stress as an alternative to the abandonment of Peel town, Swan River colony, 1829-1830

“ABSTRACT”

Peel town, one of many coastal camps established with the 1829 British colonization of the Swan River in the southwest of Australia, collapsed after 11-months of hardship. It has been long considered that dislike of the camp's leader Thomas Peel was the main reason for the abandonment of the camp. However, the analysis of charcoal from hearths, fireplaces, and ash pits associated with five dwellings from the camp suggest that during their stay colonists exhausted local wood as fuel, forcing them to use timber containers, furniture, and ship's timbers as firewood. The results propose that colonists were under extreme resource stress that contributed to the camp's abandonment.

Between December 1829 and November 1830, a group of colonists inhabited a camp in coastal sand dunes and woodland in the lower west corner of Australia. Comprising a large part of the initial British settlement of the Swan River – one of many colonizing events between 1760 and 1860 that spread British culture globally – the group comprising about 500 men, women, and children were from a wide range of regional and economic backgrounds. They most likely had differing expectations about what was required to colonize a new land, but it is doubtful they foresaw the circumstances that incompetent and poor leadership thrust them into in the new physical and cultural environment. Many struggled. Their leader, Thomas Peel, received much of the blame for the position the colonists found themselves, and he was openly disliked by most. Peel had invested heavily bringing the group to the Swan River in return for a large allocation of land, but his poor leadership and occasional absences from the camp fueled a sense of abandonment among the group. In July 1830, after eight months of neglect, some colonists requested to break legally their contracts they had made with Peel (Collie 1830; Hasluck 1965). The leadership group of the fledgling Swan River colony approved the request, and by November 1830, most colonists had left the camp for other parts of the Swan River colony, leaving Thomas Peel's plans ruined.

The archaeology of this camp called Peel town – also known as Clarence, Brighton or Canvas Town (*Sydney Gazette* 1830:2) – is rich and well-preserved, supplying data for a myriad of research topics connected to the first steps of colonizing a new land. However, this paper focuses on the reasons for camp abandonment and in particular whether the archaeology can identify stress related behavior. Artifacts linked with many functions have been collected and analyzed, but it is the excavation of features containing large amounts of charcoal, food remains and other artifacts deposited during the camp's 11-month occupation that this paper describes and interprets. The results of the analysis of this material provides other reasons to account for the camp's abandonment apart from dislike for the group's

leader. The material collected from five dwellings occupied by family units suggests that colonists approached the procurement of fuel for cooking and heating in different ways, with some actions suggesting an escalation in stress related behavior. The results imply that other problems not described in the historical record, such as the gradual reduction of resources and the uneconomical behavior required to obtain them, made living at the camp untenable and most likely contributed to the camp's desertion.

Peel town in the Historical Record

Peel town's members were part of the vanguard of the British colonization of the Swan River on the lower west coast of Australia (Figure 1), the first British settlement of the Australian continent that was not convict-related like the previous British colonies of New South Wales and Van Diemen's Land. The main colonizing group arrived from Britain between June 1829 and May 1830, forming coast-based camps such as Peel town near the Swan River's mouth with the Indian Ocean. The number of people at Peel town was similar to the Swan River colony's main camp at Fremantle 10 mi. (16 km) north. However, unlike Fremantle and other camps, all of Peel town's members were part of a single settlement syndicate. The terms arranged between the British Colonial Office and the syndicate's leader Thomas Peel are complex, but originally Peel proposed sending 10,000 people and receiving four million acres (1.6 million ha) in return (Peel et al. 1828:589). However, for various reasons, the Colonial Office reduced the amount of land to one million acres (404,000 ha) and introduced a stipulation that Peel and 400 colonists had to arrive at the Swan River by 1 November 1829 to receive an initial allocation of 250,000 acres (101,000 ha) (Twiss 1829a:611, 1829b:612-613).

Peel – part of a wealthy Lancastrian cotton milling family – used newspapers and handbills to disseminate his plans to the British public to form a settlement group, and by June 1829, many families and individuals had signed agreements to emigrate to the Swan River as part of Peel's syndicate (Hasluck 1965:55-56). The articles of agreement varied between individuals, but agricultural laborers and trades-people signed on to work for Peel for five years at a wage of between three and five shillings a day and with the promise of 50 acres of land after three years (James Stone and Company 1829a, 1829b). The settlement group also contained middle class professionals like surgeons and surveyors, and families of former officers of the British navy and army who were attracted by Peel's offer of land grants of between 200 and 1,000 acres (James Stone and Company 1829c, 1829d; Hillman 1836). The shortage of vessels forced Peel to stagger the departure of his colonists from Britain over a six-month period; the first ship, the *Gilmore*, with 180 colonists, departed 10 August 1829 (Hasluck 1965:69).

Unfortunately for Peel and the colonists, the *Gilmore* arrived off the coast of Western Australia six-weeks' late on 15 December 1829 (Scott 1829). The group's failure to arrive before the specified time of 1 November severed the syndicate's arrangement with the Colonial Office and voided all claims by Peel to the 250,000 acres. However, for the lieutenant governor of the Swan River colony James Stirling, support was essential for Peel and his group. They made a significant numerical contribution to the Swan River's British population, and returning them to Britain would have jeopardized the young colony's survival. However, Stirling was grappling with the enormity and the problems of overall leader of a new colony and unwilling to resolve immediately the tribulations of Peel and his colonists. With nowhere to go until Peel and Stirling made new arrangements, in late December 1829 *Gilmore's* 180 colonists established themselves on the Cockburn Sound coast near Brown Hill 10 mi. (16 km) south of the main colonist camp at Fremantle (Friend

1830; Roe 1836). Bad luck, but mostly bad management on behalf of the syndicate's leader, counteracted the advantages of becoming a member of an organized, structured colonizing venture, and instead, the colonists found themselves dumped on a foreign shore.

Two months after the *Gilmore's* arrival, the second ship containing Peel's colonists – *Hooghly* – arrived with 176 people after a three-month voyage (Scott 1830a). The *Hooghly* colonists joined the group from the *Gilmore*, but selected for settlement an area a short distance from the already established camp, forming their own enclave of Peel town called “Hooghly Town” (Bayly 1831; *Sydney Gazette* 1830:2).

Across the camp, families with men with trades like brick making, carpentry, or boat building appear to have used their manual skills to construct habitable structures, while others erected tents and marquees that they had brought from Britain. However, many less dexterous individuals were unable to build shelters, while others produced flimsy structures that leaked or were destroyed when storms arrived in the middle of March 1830 (Bayly 1831).

The last of Peel's ships – the *Rockingham* – arrived on 14 May 1830 with the final installment of colonists (Scott 1830b). Its arrival coincided with a large storm that forced the ship aground on the beach about 0.5 mi. (800 m) south of the camp (*Perth Gazette* 1835:567; Shaw 1939:72-75; Heal 1988:32-34; Shardlow and Shardlow 2007:12-17). Despite the mishap, all disembarked safely, but their arrival resulted in a further 152 people at Peel town and a camp population totaling about 500.

The conditions experienced by colonists at Peel town are oft-cited as part of the story of the supposedly disastrous first years of the Swan River colony (Battye 1912: 43; Colebatch 1929: 23). Despite the notoriety, there is a surprising dearth of primary historical sources, with Alexander Collie's (1830) medical report the only contemporary primary source about life there between December 1829 and November 1830. Members of other Swan River

colony camps knew of the conditions at Peel town, for most mention Peel and his group in letters and diaries (Friend 1830). Information flowed freely from the colony storekeeper on Garden Island opposite Peel town to Lieutenant Governor Stirling (Morgan 1830a, 1830b), while some heard of the camp's privations from others visiting the camp (Friend 1830), but few mention the living conditions. George Bayly, who was the *Hooghly's* second officer, left a reasonably accurate account, but his descriptions of the camp applied to the period from the *Hooghly's* February 1830 arrival to its mid-March departure for Sydney and as a result, it does not mention later camp conditions.

The release on 14 July 1830 of some single men and a few families from their contracts with Peel due to the non-payment of wages is the first evidence in the primary sources of unrest in the camp (Leake et al. 1830; Leake and Henty 1830). Their release, and news of illness at the camp, resulted in Stirling requesting Assistant Surgeon Collie of the 63rd Regiment onboard HMS *Sulphur* moored off the coast to visit the camp and prepare a report (Dance 1830). Furnished to Stirling on 25 July, Collie's four-page document is moving but impassive, stating that 28 people had died since arriving, most due to dysentery, scurvy and childbirth complications (Collie 1830). According to Collie, sickness was rife, especially among children unaccustomed to a continuous salted meat diet. He mentioned that the camp had partly fragmented on instructions from Thomas Peel, with 12 families from the *Rockingham* moved 22 mi. (35 km) south to Mangles Bay, and a further family of seven and 12 single men further south again to a site on the banks of the Murray River (Collie 1830; Robinson et al. 1830). The health of the people at these satellite camps was much better than at Peel town.

Collie's July 1830 report mentioned Thomas Peel's absence from the camp, and Jane Dodds, one of the *Rockingham's* cabin passengers, also mentioned that Peel was not present when she arrived in May (Heal 1988:31). Others mention that Peel town without leadership

was the site of anarchy (Dunnage 1830; P. Meares 1830; Smithers 1830), but none provide details about colonists' subsistence practices or specific behavior. However, news that the social conditions at the camp were poor forced Stirling and the Swan River's Colonial Secretary Peter Brown to send a deputation to the camp in October 1830. They suggested to those remaining that they pay Peel their passage money in exchange for the cancellation of their articles of agreement (*Perth Gazette* 1833:76; Gill 1963:164). Most took advantage of this suggestion and, by November 1830, most had left (R. Meares 1830). Given their leave to depart, members of Peel's syndication spread through the slowly developing Swan River colony, their hatred of Thomas Peel obvious (Bunbury 1836). Over the next three years, cases for unpaid wages and for the return of goods from Peel were common in the civil court by colonists who began their Swan River colony experience at Peel town (*Perth Gazette* 1833:75-76, 1833:79, 1837:936).

The Archaeological Record of Peel town

There is much literature on the history and archaeology of colonizing new areas during the modern era (Crosby 1975; Stevenson 1982; McGowan 1985; Hardesty 1988; Richards 1999; Blanton 2003; Rockman 2003, 2010; Allen 2008 to name a few). However, few examine or attempt to identify signs in the archaeological record suggesting stress related behavior. The research on the Donner Party trapped in snowbound Sierra Nevada (Hardesty 1997; Dixon et al. 2011; Ellis et al. 2011) and Blanton's (2000, 2003) and Rockman's (2010) research into Jamestown during the initial colonizing phase are the best known, with Gibbs' (2003) analysis framed towards maritime disasters the exceptions. Testing the archaeological signature for evidence of stress that led to the abandonment of Peel town is this study's major

driver, encapsulated within seminal questions about how quickly colonists learned about resources in a new area, the appropriateness of a colonizer's culture to a new environment and, from a material perspective, what the objects left behind represent about the effectiveness of knowledge gathering (Rockman 2003:3, 2010). Wishing to observe how colonists learned about new resources in the camp area and their subsistence practices resulted in a focus on cooking hearths and fireplaces. Charcoal from firewood, food remains and other artifacts associated with these features provided clear evidence for behavior related to stress.

Since discovery of the site by the author in 2006 (Burke 2007), excavations have provided many artifacts and features from within the camp's approximate 65-acre (26 ha) footprint, including five sites comprising vestiges of structures. The sites contained the remains of rudimentary hearths and fireplaces made of imported low-fired yellow brick and local limestone, carbonized timber posts and rope pegs of iron. Other artifacts suggest a habitation and food preparation function for the five sites.

The distance from each site (Figure 1) and evidence from the historical (Smythe 1830; *Sydney Gazette* 1830:2; Bayly 1831) and archaeological records suggest that separate family units or groups occupied these sites during Peel town's occupation. Two of the sites can be identified to specific families or groups. Site 2 was the dwelling of the Crisp family comprising John and Martha and six children under the age of nine (Scott 1829; Erickson 1988:713). John Crisp was a carpenter, he and the family arriving on the *Gilmore* (Scott 1829). George Barrow and his servant William Burne can be fixed to Site 4 (Smythe 1830; Barrow 1833). Barrow arrived in February 1830 on the *Hooghly* as a cabin passenger suggesting that he was of the gentry class, but he departed Peel town in August 1830 most likely returning to Britain leaving his servant behind. Shortly after, Thomas Bailey and his five children occupied Barrow's dwelling (Elmslie 1831a, 1831b). The Bailey family story in

the new colony is one of heartbreak, with Thomas' wife Ann dying in childbirth in August 1830 (State Records Office of Western Australia CON 4043) and the family destitute at Site 4 until at least July 1831 (Bailey 1831a, 1831b; Elmslie 1831a, 1831b).

Before moving to Barrow's dwelling, Bailey, along with the Elmslie, Oakley and Lyttleton families, lived in a complex of structures about 500 yards (460 m) from the beach. Bailey, Adam Elmslie and William Oakley were foremen employed by Thomas Peel to oversee the allocation of supplies to Peel's group while John Lyttleton – part of the middle class professional group attracted by promises of land in the colonies – was the camp's surgeon. Sites 1 and 3 are linked to these families, but it is unclear which site is associated with which family. It is also unclear who occupied Site 5.

The five sites were occupied at different times during the camp's 11-month existence. Surveyor George Smythe's map of the camp dated to late February 1830 showed dwellings corresponding with Sites 1, 2, 3, and 4 (Smythe 1830, Figure 2). However, the area on the map where Site 5 exists is uninhabited, suggesting that Sites 1 to 3 were most likely established from late December 1829 when the Bailey, Elmslie and Lyttleton families arrived on the *Gilmore*. Barrow at Site 4 arrived on the *Hooghly*, with his dwelling's inclusion on the map indicating that he and his servant erected their lodging rapidly. Site 5 was established after late February 1830 and is a structure associated with Hooghly Town.

Colonists' ignorance of the high inflammability of Australian vegetation in summer resulted in many accidentally lit bushfires at Peel town, with fires in late February and March 1830 razing a number of colonists' dwellings (Friend 1830; Bayly 1831). Fire – most likely associated with the large bushfire Bayly (1831) discusses in March 1830 – appears to have destroyed the timber structures at Sites 1 and 3 and providing a *terminus ante quem* of March 1830 for the archaeology of the two sites. The historical record suggests that Site 4 – occupied at different times by Barrow and the Bailey family – had the longest use of the five

sites and was possibly one of the last dwellings occupied at Peel town (Elmslie 1831a, 1831b). However, it is unclear when the Crisp family abandoned Site 2 or when Site 5 was vacated.

It is pertinent to describe the Peel town area's vegetation given this paper's concentration on the procurement of firewood for heating and cooking. Salt laden winds, soil type, and topography influence vegetation across the site. An open coastal heath of salt tolerant bushes (*Olearia exillaris*; wild rosemary, *Acacia lasiocarpa*; glow wattle, *Hakea prostrata*; harsh hakea, *Grevillea preissii*, and *Banksia sessilis*; parrot bush) forms the windward vegetation of the ridge on which a section of the camp was located, while banksia woodland comprising *Banksia attenuata* (candle banksia; which is the commonest tree in the area), *Xanthorrhoea preissii* (grass tree), *Macrozamia riedlei* (zamia) and groves of stunted *Eucalyptus marginata* (jarrah), and *Eucalyptus gomphocephala* (tuart) occur on the ridge's lee (Figure 1) (Beard 1979:23-25). *Eucalyptus decipiens* (limestone marlock) exists in shallow soils over limestone in this region, while *Melaleuca raphiophylla* (paper bark) is near a brackish swamp about 800 yds. (730 m) east of the camp (Beard 1979:25). The historical record describing the area 11-years after the camp's abandonment suggests that the present vegetation reflects the vegetation regime of 1829-1830 (Gregory 1842:54).

The wood of local bushes and trees vary in quality as firewood, with the leaves of the grass tree ideal for kindling due to their impregnation with resin and the wood of jarrah, tuart, acacia and banksia burning with much heat when dry. However, other species, particularly paper bark, produce little heat and much smoke, while the fronds of the zamia palm possibly produced toxic smoke.

Methods

Methods, techniques, and sampling design to describe and collect archaeological charcoal are common in the literature, but those of Figueiral and Mosbrugger (2000:399) and Pearsall (2000) were followed in this study. The collection of deposits of charcoal as spent fuel occurred from contexts inside well-preserved hearths and fireplaces at Sites 1, 3 and 5, and from ash pits where the material had accumulated in front of hearths and fireplaces by periodic hearth and fireplace cleaning (Sites 1, 2, 4 and 5) over time. Contexts containing charcoal were excavated in 2 cm arbitrary spits, the volume of charcoal rich sediment ranging between 0.4 and 43L per spit. The sediments in bulk were dry screened, and the charcoal combined in one bag per spit.

Four hundred charcoal fragments were examined per spit apart from four basement spits at Sites 1, 2, 3 and 4 that totaled less than 400 fragments due to the small volume of excavated sediment. However, normalizing charcoal counts to sediment volume addressed the uneven number of charcoal fragments from basement spits and differences in taxon counts on a sample-by-sample basis caused by the disparity in spit volume (Marston 2014:164). Normalizing counts also allowed interspit and intersite comparison (Pearsall 2000:196-199).

The charcoal comparative collection was prepared using techniques advocated by Donoghue (1989:95) from native woody species presently growing in the area. However, early results of the examination of the archaeological charcoal suggested the need for a comparative collection of exotic woods. These were sourced from trees growing in Australia, the United States and Britain; the wood gathered those used typically by the British and others for containers (barrels, crates, and chests), furniture, structures, carriage making, and shipbuilding.

Results of Charcoal Analysis

A total of 5,762 charcoal fragments were analyzed. From these, 85 percent were identified to genus level, the high successful identification percentage due to the preservation of distinct cellular attributes brought about by the charcoal's relatively young age. Figure 3 shows the raw and normalized counts of charcoal associated with fuel from the five sites. Most of the local taxa were identified to species level, while some exotic taxa that had very similar anatomical characteristics across species (oaks, elms, *Fagus*, and pines) were identified to genus. All of the local taxa identified exist in present day vegetation, and all charcoal – with the exception of *Xanthorrhoea* – were from woody taxa.

Figure 3 shows clear differences in the normalized number of charcoal fragments between spits at individual sites and between sites over time. The oldest layers at all sites comprised many fragments of charcoal from local hard wood trees like jarrah, tuart, and candle banksia. There was then an increase in charcoal from other local species such as harsh hakea and parrot bush while paper bark increased in frequency at Site 4. Charcoal from exotic woods were present in low numbers in the base spits at some sites, but normalized numbers of fragments increased slowly and eventually dominated the youngest spits with a suite of oak, pine, elm, teak, Australian red cedar (from Australia's east coast), yew, mahogany and satinwood at Sites 2, 4, and 5. In addition, in the youngest spits, charcoal from local bush species such as grevillea and harsh hakea continued, while charcoal from jarrah and tuart – so common in the base spits – were very few.

There is a real statistical decrease in younger spits of charcoal from jarrah, tuart, and candle banksia based on the t-test result:

$$t_{30} = 3.74 \quad p > 0.001$$

rejecting the null hypothesis that there was no change in the number of charcoal fragments from jarrah, tuart and candle banksia between base and surface spits at the five sites.

The results show that charcoal from exotic wood was uncommon in all spits at Sites 1 and 3, but very common in the youngest spits at Site 2, 4, and 5. With bushfire destroying Sites 1 and 3 in February or March 1830, the results demonstrate that the reasons causing the behavior that resulted in the use of exotic wood for fuel at Sites 2, 4, and 5 most likely occurred after the destruction of Sites 1 and 3. Sites 2, 4, and 5 show extreme statistical significance based on the chi-squared test of association:

Site 2 $X^2 = 2341.974$, $df\ 1$, $p > .001$.

Site 4 $X^2 = 2353.251$, $df\ 1$, $p > .001$.

Site 5 $X^2 = 5512.85$, $df\ 1$, $p > .001$

for the null hypothesis that there is no difference between the number of exotic wood charcoal fragments between old and young deposits. There was also a strong negative correlation between exotic wood charcoal and charcoal from jarrah, tuart and candle banksia in the youngest spits based on Yule's Q results:

Site 2 $Q = -0.82$

Site 5 $Q = -0.98$

while the trend was visible but weaker at Site 4

Site 4 $Q = -0.55$.

Interpretation

The results of the analysis of charcoal fragments associated with features linked to heating and cooking at five separate sites suggest that colonists at Peel town had to use different types of wood for fuel that resulted in changes in fuel collection over time.

Despite the lack of established transport routes and reliable transportation, some from Peel town did travel to other camps like Fremantle and exchange information while colonists from Fremantle and other camps visited Peel town in their travels (Friend 1830). However, movement of stores was impossible and colonists from Peel town could not leave the camp permanently for fear of breaching contractual agreements. Furthermore, the scenario they found themselves was unlikely to change until arrangements were made between the syndicate leader and the new colony's lieutenant governor. Despite their future's uncertainty, the results suggest, however, that learning about resources in the new land occurred very quickly. Combining charcoal from the five sites into the three categories of local wood with good firewood qualities (comprising jarrah, tuart, limestone marlock, candle banksia); local wood with poor firewood qualities (paper bark, Christmas tree, grevillea, harsh hakea, parrot bush) and exotic wood (oak, elm, beech, pine, teak, West Indian mahogany, Australian red cedar, East Indian satinwood and yew), suggests a general, three-phase pattern of fuel use (Figure 4). The first phase comprises mostly charcoal from local species with good burning qualities. In addition, the results propose that colonists from the *Gilmore* rapidly discovered that the wood from certain trees was superior to others for fuel, with tuart, jarrah, and candle banksia that are very good fuels in basal spits recording the colonists' first firewood collection forays. However, jarrah and tuart today are present but uncommon in the area and one can assume this was the case in 1829 – 1830 (Gregory 1842:54), with the reduction in

charcoal fragments from these trees in younger spits suggesting their exhaustion from the area in and around the camp.

The reduction in charcoal fragments from candle banksia implies that even the wood of this very common tree was becoming harder to acquire. Colonists therefore turned to lesser ideal wood for fuel. As Figure 4 shows, there is a decrease in the number of charcoal fragments from good local firewood species and an increase in charcoal from poorer firewood species. This second phase of firewood collection would have seen colonists turning to local but less effective and harder to collect fuels. For example, the wood of parrot bush provides much heat when burned, but its prickly leaves would have made collection unpleasant, while the gathering of sufficient amounts of wood from parrot bush, grevillea and harsh hakea would have been time consuming due to the small size of the taxa. As desirable fuel sources dwindled, the colonists' hearths and fireplaces at Sites 1, 2 and 3 were fed less desirable local firewood to cook meals for the 160 who had arrived on the *Gilmore*.

The second phase – when desirable fuels became harder to acquire – coincides with the arrival of Thomas Peel's second ship the *Hooghly* with about 180 colonists aboard. The charcoal from Sites 4 and 5 established by members of this ship show similarities with the upper spits at Sites 1 and 3 and the middle spits of Site 2 that are consistent with changes in the availability of good fuel. In addition, the doubling of the camp's population with the *Hooghly*'s arrival would have exacerbated the stress on colonists to find suitable wood for fuel. Those from the *Hooghly* had little choice but to use wood that was poor fuel such as harsh hakea or – especially at Site 4 – paper bark that was most likely collected from the source near the brackish swamp about 800 yds. (730 m) east of the site.

One can deduce with confidence the behavior of colonists associated with sourcing firewood for first and second phase charcoal at all sites. However, accurately establishing the behavior that produced third phase firewood use – dominated by charcoal from exotic woods – requires evidence from other artifacts associated with the charcoal rich sediments. The contexts associated with hearths, fireplaces and ash pits also provided a large collection of non-charcoal artifacts, with presence and absence of artifacts and their frequency altering during the occupation of the sites. Figure 5 lists these artifacts by context and spit. The presence of some artifacts among the charcoal rich contexts – like fragments of English flint that arrived in the hearths and fireplaces as a result of fire making using flint and a steel striker – yellow brick that was imported by Peel for building purposes, ceramics (from forms mostly associated with food preparation), bottle glass and smoking pipes remain constant over time. However, metal artifacts and charred clamshell appear in the youngest spits of Sites 2, 4 and 5. The clamshell is from the species *Venericardia rosulenta* that inhabits rocks and sand in shallow water in Cockburn Sound (Wells and Bryce 1988:164), with their presence in the hearths, fireplaces and ash pits most likely the result of the instinctive reaction of throwing food scraps into the fire after eating a meal. Fragments of copper-based sheeting, brass drawer knobs and handles, and butterfly, butt and H-type hinges and brass tacks also appear in the youngest spits of Sites 2, 4 and 5. These artifacts, however, pale compared to the number of iron-based fasteners like nails, spikes, and bolts. Figure 6 displays these artifacts separated by length and attribute; McCarthy's (2005:169) comment that there is a myriad of terms for metal fasteners augurs the pointlessness of separating these items using other criteria. In addition, copper-based fasteners increased in younger spits.

Charcoal from exotic wood form a strong positive correlation with iron and copper-based fasteners and other metal artifacts. In addition, fasteners are not present in large numbers in basal spits at Sites 2, 4 and 5. These artifacts are also not found at Sites 1 and 3 – further evidence to suggest that colonists had abandoned these sites. To construct a plausible explanation for the behavior that resulted in a change from local wood to exotic and the introduction of large numbers of primarily metal fasteners into charcoal rich contexts, one needs to determine what the woods were specifically used for during the late 18th and 19th centuries.

Third phase charcoal

The results show that the inhabitants of Sites 2, 4 and 5 most likely behaved differently to overcome the unavailability of local firewood. At Site 2 occupied by the Crisp family, there was a rapid move from difficult to collect or poor fuel quality local woods to objects made of oak, pine, elm, teak and Australian red cedar for fuel – all woods with a variety of uses but commonly used in ship and boat building (Kenchington 1993:3; Müller 2010). Furthermore, the 22 fragments of copper-based sheet are most likely the remains of copper sheathing nailed to the timber hulls of ships to inhibit shipworm and fowling (McCarthy 2005:101). The use of a 7.75 in. x 1 ft. 1.5 in. (196 x 343 mm) piece of copper sheathing as a spark arrestor fronting the hearth at Site 2 and another 1 ft. 8 in. (508 mm) long sheet as an anchor for canvas further suggests a maritime source of wood for fuel. Evidently, nails, spikes, and sheathing were embedded in or attached to the wood when deposited into hearths and fireplaces. The copper-based nails associated with the charcoal were all counter-sunk typical of sheathing nails (McCarthy 2005:175-175), further supporting

the suggestion that the Crisps were accessing the coastline for firewood as well as building materials.

There is no mention in the historical record of colonists from Peel town collecting flotsam and jetsam from the shores of nearby Cockburn Sound, but many describe the storms that lashed the camp from March 1830 that could have conceivably deposited wreckage (Bayly 1831; Shaw 1939:74; Hasluck 1965:97-98; Henderson 1980:101-102; Heal 1988:30-31). These storms resulted in the wrecking of at least four ships on the coast between 0.5 and 6 mi. (800m and 9.6 km) from the camp, with maps of the coast of Cockburn Sound from this period strewn with ground vessels (Clint 1830a, 1830b). One of the ships wrecked was the *Rockingham*, the last of Thomas Peel's ships that ran aground on 14 May about 0.5 mi. (800 m) south of Peel town (Heal 1988:30-31).

The charcoal and metal artifacts at Site 5 suggest a different response to falling fuel supplies. The youngest spits contain a range of charcoal from exotic woods used in the production of European furniture, with *Fagus* sp., West Indian mahogany, East Indian satinwood and yew common in British furniture in particular. The versatile pine of many species was also used in British furniture. Up until 1810, it was common carpentry practice to use cheaper pine as a base wood and then veneer the item with an attractive satinwood (either the West or East Indian varieties) or mahogany (Marshall 1796:51; Horner 1906:3539-3540; Edwards 1996). The satinwoods and mahogany were also used "solid" in table and chair legs, with yew – renowned for its great plasticity – used commonly in chairs (Edwards 1996). In the context of charcoal from these woods, the copper-based domed head nails are most likely upholstery tacks (Figure 7a) often used to embellish 18th and 19th-century furniture (Johnson 2012:22), while the copper-based plain knobs and rosette handles are fixtures for drawers and cabinet doors that were still attached when the wood was used as fuel.

Six of an MNI of ten hinges were double strap hinges of the butterfly type (Figure 7b) typically used to hinge furniture cabinet doors (Priess 2000:56), but sections of one larger, asymmetrical T-strap or cross-garnet hinge used for sectioned doors or hinged lids suggests that timber crates, cases and trunks were also used as firewood. The large number of clenched nails in the youngest spit of Site 5 also supports the assertion that timber objects made with cruder carpentry skills were used as fuel. Clenching – the securing of a fastener in position by hammering down the protruding point – is a technique used in boat building for achieving a fastener’s maximum adhesion in wood (McCarthy 2005:54-55). However, having to hammer a protruding nail flat is also a sign of using a fastener that is too long for the thickness of timber being nailed – an attribute commonly seen in objects like crates and cases serving a utilitarian function and where appearance was unimportant.

Colonists of the Swan River colony of which the members of Peel town were part were granted land determined by the value of items introduced into the new colony (Statham 1981:183). Because of the land-grant system, copious documents exist listing objects that colonists claimed entitled them to land. The description and quantity of items brought with the Dunnage family who arrived on the *Gilmore* provide a hint to the types of timber objects introduced into the camp that later were possibly used for fuel. The family brought two rosewood chairs (one of any number of richly hued brownish woods often with darker grow rings), a “mahogany ship table to order of the best quality” and a piano (Dunnage 1830), while a total of 13 cases, casks, barrels and chests holding a variety of possessions suggest that colonists during the initial colonizing stages introduced into the camp many objects with a future potential as firewood. With the exhaustion of local woods, occupants of Site 5 most likely used furniture and the containers used to transport goods as firewood.

The Crisp family at Site 2 appears to have accessed wood for fuel from a marine context but overlooked furniture and containers, while those at Site 5 seem to have ignored

flotsam and jetsam and used containers and furniture instead for fuel. The third phase charcoal and metal artifacts at Site 4 suggests that the site's inhabitants – either Barrow and his servant or the Bailey family – used a combination of wood collected from Cockburn Sound and timber containers and furniture. Hinges, upholstery tacks, fragments of ship sheathing and copper-based nails were in association with charcoal fragments from oak, pine, elm, teak, *Fagus* sp., Australian red cedar and East Indian satinwood in the youngest spit.

Peel town in the Context of Stress

The historical record is divided regarding the general behavior of those at Peel town, with some sources describing boredom brought on by monotony and others suggesting aggression. However, all sources state that colonists were uncertain about their future and that there was a growing feeling of discontent in the syndicate leader Thomas Peel (P. Meares 1830; Bayly 1831; Hasluck 1965:97-98). However, after analyzing charcoal from hearth, fireplace, and ash pit, it appears that colonists – at least in the context of firewood management – were posed with ever changing circumstances resulting in continual shifts in behavior. As good quality local fuel supplies dwindled, colonists adapted first by using less suitable local fuels. This was followed by a variety of actions ranging from the use of furniture items and timber containers to scouring the coast for flotsam and jetsam.

Charcoal from wood commonly used in shipbuilding associated with clamshell in the youngest spits at Sites 2 and 4 suggest that the action of gathering ship's timber from the coastline inadvertently introduced colonists to eatable shellfish stocks on the rocks and beach. These acts are part of the process of colonizing an unknown land – the course by which individuals and groups gather, share, and use environmental information in such a way that it can be communicated to others. Learning that jarrah and tuart were the best types of wood for

firewood indicates a rapid awareness of the usefulness of this resource. The comprehension shown by colonists matches Rockman's (2003, 2010:4) "locational knowledge", one of three types of knowledge gathering relating to landscape learning. Locational knowledge comprises the gathering of information relating to the spatial and physical characteristics of particular resources. Locational knowledge is the easiest form of environmental information to collect, and in many instances can be garnered in the space of hours, days, weeks, or months (Rockman 2010:4). The discovery of outcrops of quarriable limestone and eatable shellfish is also an example of locational knowledge, but the appearance of clamshell in the youngest spits of hearths and fireplaces suggests that the discovery of the food source came some months after arrival.

Learning about the reliability of resources, however, took longer to achieve, a process Rockman (2003:4, 2010:4) refers to as "limitational knowledge". The gathering of limitational knowledge includes information about the usefulness and reliability of various resources and their ranges of variation within the overall environment. Limitational knowledge cannot be gathered instantly and only occurs with experience, with length of learning time differing dramatically for different aspects of the environment depending on the frequency of resource use or the nature of the cycle – such as the climate – being learned (Rockman 2010:4). Despite the short time at Peel town, colonists would have been initially unaware of the sustainability of good fuels because it was unclear how long they would be in the area, but as time passed during their 11-month stay, they became aware that good quality fuel was finite. As Rockman (2003:4) and Kirch (1980:130) identified, for effective adaptation to occur, people needed knowledge linked to behavior that allowed people to exist and persist in a new environment. This research suggests that insufficient resources existed in the environment to allow the large Peel town group to persist, but the corpus of data collected in the locational and limitational knowledge types about the landscape and resources meant

that colonists were aware of stocks and – significantly – their limitations. The knowledge gathered about resources most likely influenced the behavior of the colonists resulting in the eventual abandonment of Peel town.

The growing industrial proficiency of Britain aided by cheaper raw materials from its colonies made Britain and its people the first mass consumer society (Ritchie 2003:11; Cohen 2006:xvi), but the adoption of this material culture would have been uneven in regions of Britain and between the rank and occupation of British people (Karskens 2003:37-38). Furthermore, the British of this period were beginning to put huge emphasis on wealth and status through material objects (Lawrence 2003:21-22; Cohen 2006:ix). Houses, furnishings, and glass and ceramic tablewares were all used by the British in unique ways as expressions of the ideals of domesticity, the ideology or “cult” that transformed English speaking 19th century homes into highly symbolic zones (Clark 1986:114; Kasson 1990:169-170; Fitts 2001:116). Objects were designed to affect household members in terms of their sense of self and their presentation of self to others within and beyond the home, and the sentiments and attachments that people form with their belongings (Cohen 2006:44; Beaudry 2015:7). It is unlikely that one will know what types of furniture Peel town colonists used for fuel, but charcoal from expensive timber that was imported into Britain and other metallic furniture fittings suggest that some pieces were costly.

For the elite and middle class professionals, it appears that tasteful furniture and its placement in their new home was to play a similar role in the new colony as it did in Britain, expressing attitudes about how the activities of daily life should be ordered, and as a way of defining oneself in a society where it was increasingly difficult to tell people apart (Cohen 2006:xi, 14). Like in Britain, the condition of the home in the Swan River and the presence or absence of the appropriate symbols was going to identify the class of individuals (Beaudry 2015:5). Imagine, therefore, furniture – charged with symbolism and status – carefully

packed in Britain and brought 12,000 mi. (19,300 km) by sea to the Swan River, used instead to provide fuel for a hot meal. The objects' change of function in the environment of the new colony saw them get no further than 400 yds. (360 m) from the beach. In a society where tasteful furnishings "made the person" (Cohen 2006:125) and where every bad decision regarding the selection and use of objects could become a cause for regret, for some at Peel town the destruction of the tangible associated with the trappings of elite and middle class British culture would have caused intense stress, for a decision had to be made between preserving or destroying symbols of society, wealth, personal sentiment and respectability.

A further hint to behavior linked to stress comes from the historical record. In February 1831, Thomas Watson in a letter to the colony's Surveyor General John Septimus Roe requested that action be taken regarding the illegal taking of timber from this grant by Peel's colonists (Watson 1831). Watson had arrived on the *Gilmore* but was not associated with Thomas Peel's syndicate and therefore separate from the Peel town colonists. He was granted 1,000 acres of land due east of Peel town (Hillman 1836), his grant's closest boundary 2 mi. (3.2 km) from the nearest Peel town site (Site 4). The dating of the letter to February 1831 is after the time that most colonists had received their leave to depart the camp. Yet, the few remaining at the camp still needed to walk at least 4 mi. (6.4 km) to collect firewood and had to perform an illegal act to secure it. This evidence indicates that as firewood close to the camp diminished, colonists – who did not have the benefit of animal transport – had to walk increasingly longer distances to sources. While wood was available in the vast stretches of banksia and eucalypt woodland in the plain surround the camp and from wrecked ships on the coast, colonists at Peel town would have become increasingly stressed at the time and energy required to collect and carry wood. Eventually, in circumstances where illness was rife, a threshold would have been crossed where the time spent in traveling and gathering firewood for the few fit members of the camp (Collie 1830) became greater than

the time spent in preparing food, collecting water (that also required a shorter journey) and attending to other needs. The archaeological and historical evidence suggest that the gathering of fuel became uneconomical, and that the colonists at Peel town were under resource and emotional stress.

Peel town was comparable in population size to the other main camps established by the British in the Swan River area. Attributes of Peel town's archaeology – such as the use of good quality firewood and native food stocks – show that colonists had knowledge of resources and that landscape learning was occurring, a process no doubt assisted by the sharing of knowledge by individuals at the camp. Yet, the historical record eludes to events occurring at Peel town that were not experienced at other camps, while results from the camp's archaeology suggest that colonists experienced resource stress that was most likely a major contributor to the camp's abandonment – but settlements of similar size and located in similar physical environments such as Fremantle and others nearer to Peel town survived. This suggests that factors of the cultural environment most likely also played a part in the camp's collapse. Peel town was the only camp formed during the Swan River colony's first days where everyone was tied by contract to a single settlement syndicate; most of those at Fremantle and later Perth were in family sized units with greater autonomy. Despite having a similar population size, the camp at Fremantle very early had a greater range of services develop, such as merchants selling food and other goods (albeit at exorbitant prices) and hotels offering alcohol and accommodation (Friend 1830; Shaw 1830). These early businesses operated from hastily erected canvas or prefabricated structures or rough, ramshackle dwellings made of local materials – but there was an air of permanency. Visits to Fremantle by the colony's leadership group from Perth, the coming and going of ships offshore, and colonists moving from Fremantle to land in the upper reaches of the Swan and Canning Rivers meant the development of a different psyche for those at Fremantle. At Peel

town, there was no leadership, and contracts to Thomas Peel forced a group of people together until decisions were made about their future. The group was too large for the area's available resources, but the spirit of those at the camp must have been one of desertion and isolation.

Conclusion

The analysis of charcoal and other artifacts from hearths, fireplaces, and ash pits associated with a group forming the initial colonization of the Swan River in 1829-1830 suggest that over time British colonists at Peel town suffered a reduction in good quality fuel for cooking and heating. The colonists used wood from other sources to alleviate the resource crises employing a range of different behaviors that resulted in stress. Until now, it had been suggested that low morale and disquiet towards the syndicate's leader Thomas Peel was the cause of the camp's eventual collapse, but the colonists' actions – including using timber containers and furniture, scavenged timber from a marine context, or having to travel miles to secure local wood for fuel – introduce another hardship and stress that surely galvanized colonists' wishes to abandon the area.

The results suggest that colonists rapidly learned which woods were the best fuels, but the dwindling of local supplies forced the use of introduced timber objects. Colonist behavior at Peel town highlights the necessity for researchers to be alert to primary intended function, primary intended use and secondary intended use of artifacts (Crook, Lawrence and Gibbs 2002:29-30; Brooks 2005:18), for much of the charcoal collected from the youngest spits of three of the five sites came from objects that had been brought to the new colony to serve practical purposes but in some cases to symbolize class and status. Instead, they were used in the context of supplying a hot meal. In the case of Peel town in 1829-1830, the people at the

camp had material culture appropriate for life in the parts of Britain they immigrated from, but the same material culture took on new meanings and functions in the novel cultural and physical environment of the new British colony of the Swan River.

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FIGURE CAPTIONS

FIGURE 1. Map showing the location of sites, Cockburn Sound, and vegetation types in relation to Peel town. (Drawing by author, 2015.)

FIGURE 2. Detail of George Smythe's February 1830 dated map showing the location of some colonist dwellings at Peel town. Note that no dwellings exist where Site 5's excavations occurred. (Map adapted by the author 2015; Smythe 1830.)

FIGURE 3. Raw and normalized counts of charcoal from taxa associated with fuel deposits. (Drawing by author, 2015.)

FIGURE 4. Chart showing changes in wood types over time at Peel town (normalized counts used). (Drawing by author, 2015.)

FIGURE 5. Artifacts associated with charcoal rich contexts at Sites 2, 4, and 5. (Drawing by author, 2015.)

FIGURE 6. Fasteners (nails, spikes, bolts) from the five sites. Note the large increased in these artifact in Sites 2, 4, and 5's youngest spits. (Drawing by author, 2015.)

FIGURE 7. Artifacts typifying the use of timber containers and furniture for fuel at Peel town: (a) copper-based upholstery tack; (b) a single strap from a butterfly type hinge. (Drawing by author, 2015.)