



**MT MAUNGANUI STORMWATER
DRAINAGE, LEINSTER AVENUE:
ARCHAEOLOGICAL INVESTIGATION
(HNZPTA AUTHORITY 2015/1106)**

**REPORT TO
HERITAGE NEW ZEALAND POUHERE TAONGA
AND
TAURANGA CITY COUNCIL**

PETER HOLMES AND DANIELLE TRILFORD

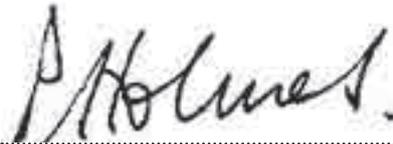
CFG
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Prepared by:


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Peter Holmes

Reviewed by:


.....
Matthew Campbell

Date: 1 February 2016

Reference: 15-0639



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MT MAUNGANUI STORMWATER DRAINAGE, LEINSTER AVENUE: ARCHAEOLOGICAL INVESTIGATION (HNZPTA AUTHORITY 2015/1106)

PETER HOLMES AND DANIELLE TRILFORD

Tauranga City Council (TCC) have installed an underground soakage system to manage stormwater along Leinster Avenue, Mt Maunganui. These works are located in a dense archaeological landscape that includes the Waikoriri / Pilot Bay site, recorded with the New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS) as site U14/363, an early period occupation 600 m to the south in the block bounded by The Mall, Prince Ave, Victoria Road and Salisbury Ave, as well as several other later midden deposits located throughout the township. These middens have been heavily impacted by housing and urban development but remnants survive (e.g., Holmes et al. 2014), including potentially within the Leinster Avenue road reserve. TCC applied to Heritage New Zealand Pouhere Taonga (HNZPT) for an archaeological authority under section 44 of the Heritage New Zealand Pouhere Taonga Act 2014 to modify and destroy any archaeology found during the works. Authority 2015/1106 was granted by HNZPT on 12 May 2015. Chris Nichols of TCC commissioned CFG Heritage Ltd to monitor earthworks for the project.

Background

Mt Maunganui township is located on the tombolo that connects Mauao (Mt Maunganui) to the mainland. Mauao is an extinct volcano with steep sides and a flat top, which was formed between 2.36 and 2.28 million years ago. The tombolo consists of dune sands with thin peaty layers, intercalated with thin air fall tephra (Briggs et al. 1996: 6). Together Mauao and its associated tombolo create the eastern flank of the Tauranga Harbour. The inner bay of the tombolo provides a sheltered anchorage and estuarine marine species, while the outer, ocean beach provides open coast resources. Rocky shore species can be found around the base of Mauao.

Traditional history and archaeological background

Several waka are recorded as having visited Tauranga, including *Takitumu*, *Tainui* and *Te Arawa*. From the crews of these waka, particularly *Takitumu*, Waitaha a Hei and Ngati Ranginui were descended. These hapu occupied Mt Maunganui and Mauao until they were displaced by Ngaiterangi in the 18th century (Stokes 1980). The Bay of Plenty is well known for its mild climate, fertile soils and abundant shellfish and fish populations, which supported a large pre-European population, and the region has one of the highest densities of archaeological sites in the country (McFadgen 2007: 173).

The area south of Mauao was traditionally known as Hopu Kiore, a name now associated with Mt Drury in particular (Phillips 2008: 9). At the time of European contact Ngaiterangi were in possession of the area although Waitaha and Ranginui identities survived. The first Europeans in the Bay of Plenty were missionaries and traders: Samuel Marsden passed through the Tauranga area in 1820 and Phillip



1. Location of the project earthworks, showing archaeological sites recorded in the area.

Tapsell set up his trading station at Maketu from 1830. During the following decade sporadic European visits were interspersed with musket warfare. In 1834 a mission station was established at Tauranga, with Alfred Nesbitt Brown taking up residence from 1838. Tapsell's trading station at Maketu brought increasing quantities of European goods to Tauranga. The first military presence in the area was at Mt Drury, where the 80th Regiment established a camp in 1842 in response to raids by Taraia of Ngati Tamatera (Stokes 1980). The site of this camp is recorded as site U14/429.

U14/363, Waikoriri / Pilot Bay

Waikoriri, or the Pilot Bay site, was first recorded in the late 1960s by Kathryn Fletcher and entered into the SRS in 1981. It is an early period pre-European

Maori midden. Further information on the site has been added by Mallows and Cable (2006), Mallows (2007), Hooker (2010) Holmes et al (2014) and Phillips and McCaffrey (n.d.).

An archaeological survey carried out by Phillips (2009) did not identify any previously unrecorded archaeological sites but further components of U14/363 were identified, comprising shell middens and lithic material, along the high water mark on Pilot Bay Beach at the western end of Commons Avenue.

Parts of the site were exposed by trenching in The Mall between Prince and Salisbury Avenues in 2006 (Mallows and Cable 2006), and investigated later that year (Mallows 2007). The stratigraphy identified at the site includes two distinct pre-European layers between 400 and 500 mm below the road surface, comprising an early, artefact rich, charcoal stained sand layer below a layer dominated by processed shellfish middens. These deposits overlay sterile dune sand with windblown deposits intercutting the cultural stratigraphy. Artefacts have been recovered from the earlier lower layer that can be generally associated with the early period of pre-European Maori history. Radiocarbon dates obtained for the lowest or earliest layer are typically early 14th to early 15th century AD (Mallows 2007; Hooker 2010).

Hooker, at 37 The Mall, approximately 20–30 m west of Mallows' excavation, found the same early period layer situated immediately above a Kaharoa Ash deposit that covered the area ca AD 1314, supporting the early status of this archaeological landscape (Hooker 2010).

In 2013 Archaeology B.O.P. monitored works connected with the installation of a boardwalk along The Mall and upgrade of storm water infrastructure. A preliminary report is now available for this work (Phillips and McCaffrey n.d.). The most significant finds were located opposite 34 and 35 The Mall, where Mallows (2007) had monitored trenching. Two 4 x 4 m squares were excavated by hand, revealing two distinct layers with artefacts and faunal remains relating to the early period in the lower layer, and shellfish rich midden in the upper layer, the same stratigraphic sequence found by Mallows. A multiple secondary burial was among the features found associated with the lower, early period layer. Other discrete midden deposits and fire scoops were also found along the length of the boardwalk. Analysis of this investigation is still ongoing.

Monitoring of drill pits for fibre optic cables in Mt Maunganui by CFG Heritage in 2014 also found the two midden lenses at Waikoriri, but noted that late period middens were found throughout the project area. Holmes et al (2104) concluded that the Mt Maunagnui tombolo was part of the same extensive landscape of middens found on the Papamoia dune plain, where it has been well described as a result of mitigation excavations in the past 25 years (Campbell et al 2009). This landscape extends from Mauou to the Kaituna mouth. Waikoriri is the only known early period site at the north end of this landscape (another is recorded at Te Tumu, Campbell 2013), while the other middens at Mt Maunganui are typical of what has been found at Papamoia, though badly affected by urban development.

Artefacts recovered from Waikoriri are predominantly related to fishing and wood working, and include fishhooks, drill points, tattoo chisels, adzes and blanks, etc., as well as numerous flakes of obsidian and chert.

U14/429, Hopu Kiore / Mt Drury

Hopu Kiore is a pa located on the hill in the Mt Drury Reserve, with terraces, pits and midden still visible. Five small caves are known to have been used as burial caves. Mt Drury refers to an 1842 military camp, for which little surface evidence remains although Phillips (2008: 25; see also Hudson 2012) identified a terrace that

may have been associated with it opposite the Rita St intersection, and one of the caves was modified for storage during the military occupation.

Unrecorded burial

Phillips (2009: 13) records that “early photos of the ocean beach foredunes indicate significant instability occurred at this time with mobile sand sheets migrating onto the narrow section of the tombolo on the northern side of Mt Drury. In the 1920s blowouts on the foredunes in this area exposed an extensive burial ground possibly associated with the Ngapuhi raids of the 1820s.” The exact location of these burials is not known, nor is their current condition or survival, but this record does indicate the possibility of accidental discoveries of koiwi – this has been the case at Monmouth Street (Holmes 2013) and Ocean Beach Road (Hudson 2013).

Methodology

The trench required for the soakage system consisted of two adjoining sections following the kerb line bordering the western side of Leinster Avenue and extending from the kerb into the middle of the road. The trench was dug by a hydraulic excavator under the supervision of the archaeologist. When archaeological material was encountered, trenching ceased and the features were excavated and sampled by hand. Features were described, digitally photographed, and located with hand held GPS, accurate to ± 5 m. Machine excavation then recommenced. Works were carried out from the 16 to 25 June 2015 and were monitored by Peter Holmes of CFG Heritage Ltd. A final site inspection of was carried out on 7 July 2015.

Results

Stratigraphy

Beneath the road, which was up to 200–400 mm deep, Layer 1 was a loose, light-grey wind-blown dune sand, finishing at 1200–1300 mm below the road surface. Some disturbed midden deposits containing modern material were found in Layer 1. The intact archaeological deposits were found below this in Layer 2, an undulating sand layer between 800–1000 mm deep, consisting of dark grey charcoal stained sand (Figure 2). Layer 2 is the only cultural horizon at the site, but it occasionally diverges into two lenses separated by clean sand that unite again to a single layer. There are some features from the upper lens of Layer 2 which are disturbed with evidence of modern redeposited material. Below this was the sterile Layer 3, a highly consolidated iron stained orange sand.

Features

There was no evidence of cultural deposits in the northern 32 m of the trench. All artefacts and features were recovered in the remaining southern 63 m, toward The Mall. A total of 14 features were recorded on site, but 5 of these were subsequently confirmed to be natural shell deposits with no evidence of burning or shell exploitation, and 2 were disturbed or modern deposits containing plastic and metal. These are listed in Table 1 but not described further.

Feature 2

Feature 2 was a fire scoop with fine charcoal fragments (Figure 4). These were sampled. The feature was exposed at 1200 mm below the ground surface, and measured 300 x 150 mm x 150 mm deep.



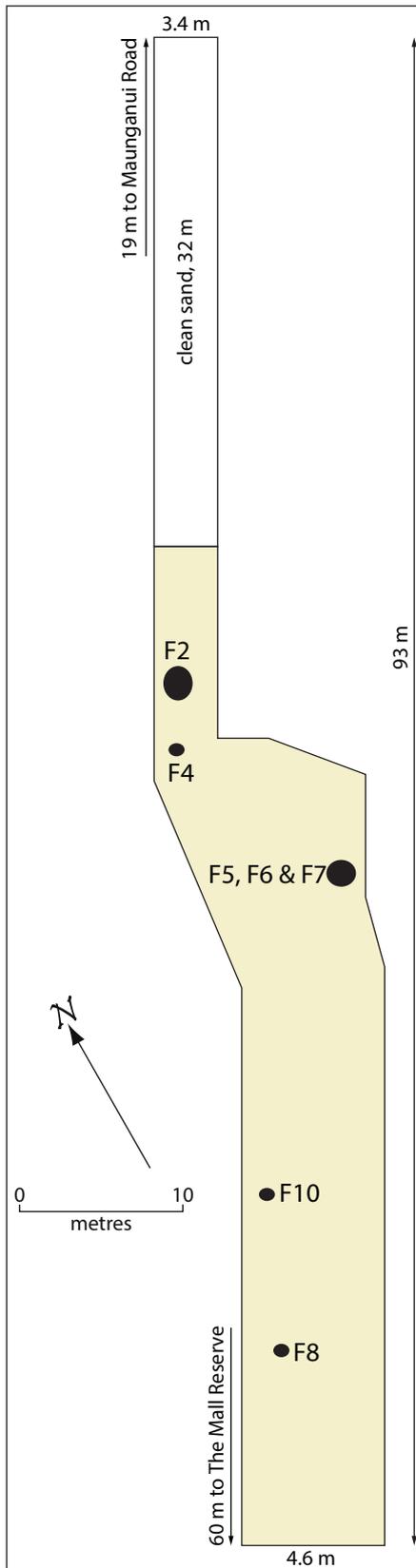
2. Typical stratigraphy of U14/363, with diverging lenses in Layer 2 to the right of the photo scale (scale = 1 m).

Feature	Sample type	Grid reference (NZTM)
1	Natural shell deposit	
2	Charcoal	1880469 E 5830053 N
3	Natural shell deposit	
4	Fire cracked rock, charcoal, pumice fragments	1880466 E 5830048 N
5	Midden and fire cracked rock	1880467 E 5830041 N
6	Fire cracked rock	1880467 E 5830042 N
7	Midden and fire cracked rock	1880467 E 5830042 N
8	Midden (3 discrete deposits) and obsidian	1880466 E 5830044 N
9	Natural shell deposit	
10	Charcoal	1880453 E 5830020 N
11	Modern shell deposit containing plastic	
12	Natural shell deposit	
13	Natural shell deposit	
14	Midden and fire cracked rock with metal fragments	

Table 1. Summary of features investigated and sampled. Grid references are taken by handheld GPS, accurate to ± 5 m.

Feature 4

Feature 4 had no clear outline and was probably rakeout from a nearby firescoop. It contained fire cracked rock, pumice and charcoal but no diagnostic shell. This feature was located in Layer 2, 1350 mm below the road surface, at a point where Layer 2 diverged into two separate lenses (Figure 5).



3. Plan of excavated features.

Feature 5

Feature 5 was an oval shaped midden deposit that measured 1300 x 700 mm x 250 mm deep. The midden was within a dark charcoal stained sandy matrix located 1450 mm below the road surface (Figure 6). As well as shell, the midden also contained a pumice fragment and a fragment of fire cracked rock. It was close to Feature 4, but was approximately 150 mm deeper.

Features 6 and 7

Feature 6 was an intact firescoop containing fire cracked rock and charcoal cut into the sand matrix of Layer 2, in the lower lens (Figure 7). It was closely related to Feature 7, a midden deposit 1200 x 800 mm x 500 mm deep.

Feature 8

Feature 8 was a collection of 3 shallow discrete midden deposits, possibly remnants of a larger deflated midden, recorded as Feature 8A, 8B, and 8C (Figure 8). Feature 8A was 260 mm wide, Feature 8B was 500 mm wide and Feature 8C was 450 mm wide. A broken obsidian pebble was discovered very near Feature 8B. Although it is not native to the dune and would have been brought on site by people, it has no evidence of having been worked.

Feature 10

Feature 10 was a small firescoop measuring 400 x 400 mm x 100 mm deep, marked by charcoal but containing no shell or fire cracked rock (Figure 9).

Analysis

Chronology

Samples of pipi shell (*Paphies australis*) from Feature 5 and 7 were submitted to the Waikato Radiocarbon Laboratory for radiocarbon dating (Table 2, Appendix A). The results indicate occupation from the late 16th century and into the 17th century (1500 – 1600 AD). These dates sit in the middle of the pre-European Maori sequence. Most reported dates from Mt Maunganui (see Holmes et al 2014 for a summary) are 100–150 years older than these dates, with Waikoriri dating to the 14th–15th centuries.

Charcoal

Charcoal extracted from bulk samples from six features was submitted to Rod Wallace of the Anthropology Department, University of Auckland, for analysis and identification (Appendix B). Shrub and scrub species dominate with some puriri and pohutukawa except for Feature 4, where a possible piece of charred totara was found. A range of different



4 (top left). Feature 2 excavated in half section to show the fine charcoal scoop deposit.

5 (top centre). Feature 4 in the foreground and the divergent lenses of Layer 2 in the baulk.

6 (top right). Feature 5 during excavation.

7 (above left). Feature 6 prior to excavation.

8 (above right). Feature 8A (top left), 8B (top right), and 8C (bottom right) before investigation.

9 (left). Feature 10 excavated in half section.

Context	Lab No.	CRA BP	$\delta^{13}C$	cal AD 68%	cal AD 95%
Feature 5	Wk-42819	633 \pm 31	1.4 \pm 0.2‰	1571–1712	1529–1815
Feature 7	Wk-42818	647 \pm 28	1.1 \pm 0.2‰	1573–1696	1521–1777 (93.0%) 1783–1805 (2.4%)

Table 2. Radiocarbon dates from Leinster Ave.

tree, shrub and scrub species are represented, generally indicative of regenerating secondary regrowth following initial or repeated vegetation clearance, but the number of samples is too few to enable a reconstruction of the local environment in any detail.

Midden samples

Bulk samples of midden were retrieved from all features which had faunal material. The samples were dried and weighed, wet sieved through a 3 mm screen, re-dried and re-weighed (Table 3). They were then sorted to class (shell, bone, stone) for specialist analysis. Shell that did not have any diagnostic portions was classed as residue.

Context	Dry weight (g)	Sieved weight (g)
Feature 2	6520	20
Feature 4	10350	380
Feature 5	55230	5840
Feature 6	6210	1030
Feature 7	47040	2770
Feature 8	8420	40
Feature 10	9640	10

Table 3. Dry and sieved weights of midden samples.

Fish

Fish identification followed the methodology outlined in Campbell (2016), adapted from the methodology developed by Leach (1986). Leach's method relied on the identification of five mouth bones: the dentary, articular, quadrate, maxilla and premaxilla; as well as several 'specials' such as pharyngeal of wrasses or barbs of stingrays. Campbell expanded this list to include: the palatine, hyomandibular, opercular, preopercular, ceratohyal, epihyal, supracliethrum, cliethrum, scapula, posttemporal, vomer and parasphenoid; as well as vertebrae. Scutes, bony scales along the lateral lines of Carangidae (mackerels, trevallies and kingfish) were also identified.

Fish were only recovered from two features and numbers were low (Table 4). As is usual on the sandy open beaches of the western Bay of Plenty, mackerel (*Trachurus* sp.) are the most common species (Campbell 2005, 2016; Campbell, et al. 2009; Felgate 2005; Gumbley 2010; Gumbley 2011; Irwin et al. 2004). Small numbers of barracouta (*Thyrsites atun*) are also indicative of open sea fishing, while wrasses (Labridae sp.) live on rocky reefs, probably the nearby base of Mauao or Moturiki Island. Numbers of vertebrae and scutes for mackerel are generally

Context	Wrasse (Labridae sp.)	Barracouta (<i>Thyrsites atun</i>)	Mackerel (<i>Trachurus</i> sp.)
Feature 5	1	1	15 (22) [17]
Feature 7			17 (25) [7]

Table 4. Counts of fish bone (NISP) from excavated contexts: unbracketed = count of cranial bones; round brackets = count of vertebrae; square brackets = count of scutes, mackerel only.

consistent with numbers of cranial bones, indicating that fish were generally being bought on site as whole specimens.

No mammal or bird bone was recovered.

Shell

Pipi (*Paphies australis*) were the most common species of shellfish, accounting for over half the counts in most samples (Table 5). In all samples tuatua (*Paphies subtriangulata*) were also present. Tuatua are an open beach species, whereas pipi are found in harbours and estuaries (Morley, 2004: 47–48), indicating that shellfish from both sides of the Mt Maunganui tombolo were being exploited. The sample from Feature 14 included rocky shore species such as the mussel and oyster, probably from around the base of Mauao, but this was from a disturbed context and was not analysed further.

Context	Pipi (<i>Paphies australis</i>)	Tuatua (<i>Paphies subtriangulata</i>)	Tuangi cockle (<i>Austrovenus stutchburyi</i>)	Mussel (<i>Mytilidae</i> sp.)	Miscellaneous gastropods
Feature 4	266	2	23	1	19
Feature 7	98	2	15		7
Feature 8	4	6			

Table 5. Counts of shellfish (NISP) from excavated contexts.

Discussion and conclusion

The archaeological investigations for this project have shown the extent of disruption to the archaeology of Mt Maunganui. Intact archaeological material was discovered in Layer 2, however within this layer Features 11 and 14 had inclusions of modern material (plastic and rusted metal) indicating that they were disturbed. Archaeological midden and natural shell deposits can often be visually differentiated, mostly based on the condition of the faunal material, size variations, breadth of species present, and whether any charcoal or burning is visible. Both Features 11 and 14 appear to be archaeological, although only 14 contained charcoal.

Sand dune systems have very dynamic morphology due to wind movement. This often means the topography of an archaeological horizon at a sand dune complex can have many lenses and stratigraphic layers from a single phase of occupation. Layer 2 is an example of this, diverging into two lenses in places, with the natural sediment in between these lenses is a sterile pale grey or light brown windblown dune sand (Figure 5). The chronology at the site suggests the site was used at least during the late 16th and into the 17th century, however there was no samples suitable to determine any fine grained chronology or time depth within the Layer 2 occupation.

Archaeological sites which are investigated piecemeal portions are generally poorly understood. The site extent, occupation patterns, time depth, spatial relationships between activity areas, and other attributes cannot be addressed in depth. There is rarely any overarching interpretation of staged excavations, which usually remain descriptive at best. While these wider issues apply to the current investigations at the Leinster Avenue site, this present study has confirmed some details about the past human occupation of the site. People were exploiting mostly shallow shore food resources across the Mt Maunganui tombolo through the late 16th–17th centuries. The evidence of burnt shell and bone with a charcoal stained layer and fire cracked rock strewn through the site, but an absence of any substantial fire features (hangi, scoops, and hearths) suggests that cooking may have occurred at another part of the site. The presence of strewn fire cracked rock also indicates that there may have been rake outs of fire features for reuse. This could also be attributed to site disturbance, as already indicated by metal fragments. This extensive disturbance is another aspect of the archaeology of Mt Maunganui that has been confirmed by this investigation, and because of this disturbance it isn't clear how the middens and features found relate to each other, or even that they are part of the same occupation.

The archaeological landscape across the Mt Maunganui tombolo has been heavily developed since the early 1820s (Stokes 1980), meaning many sites have probably been lost to historical development. The damage to two features, with modern material mixed into the archaeological deposits, from this investigation is testament to this. The continuity of the dune plain landscape between Mauou and the Kaituna mouth is demonstrated by these investigations, but the details of occupation at Mt Maunganui remain poorly understood due to piecemeal investigation and extensive site destruction.

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APPENDIX A RADIOCARBON DATES



Radiocarbon Dating Laboratory

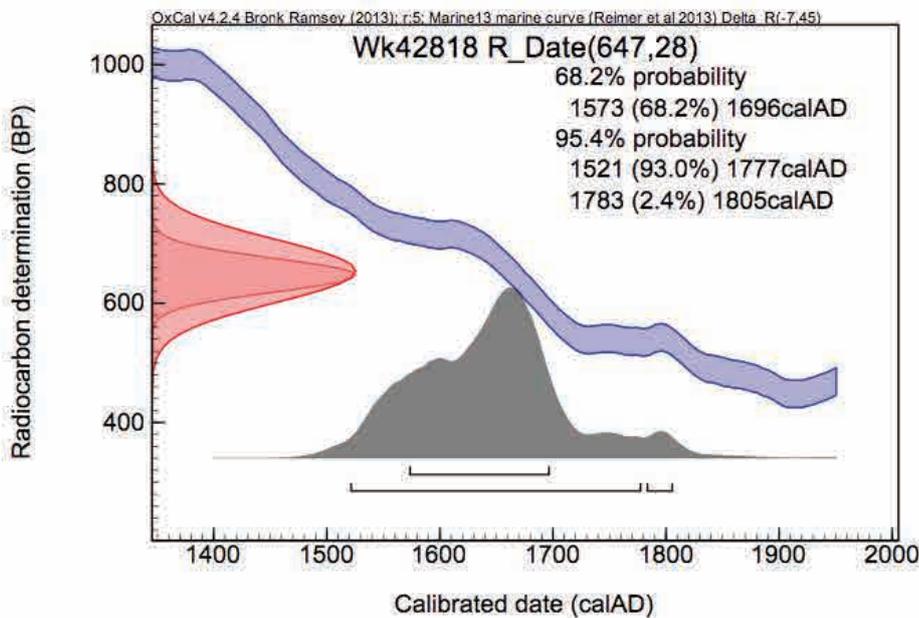
Tuesday, 15 December 2015

Report on Radiocarbon Age Determination for Wk- 42818

Submitter	M Campbell
Submitter's Code	F7
Site & Location	Leinster Ave, Mt Maunganui, New Zealand
Sample Material	Paphies australis
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	1.1 ± 0.2 ‰
D ¹⁴ C	-77.4 ± 3.2 ‰
F ¹⁴ C%	92.3 ± 0.3 %
Result	647 ± 28 BP

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO₂.
- F¹⁴C% is also known as *Percent Modern Carbon (pMC)*.

Ali Hogg



Radiocarbon Dating Laboratory

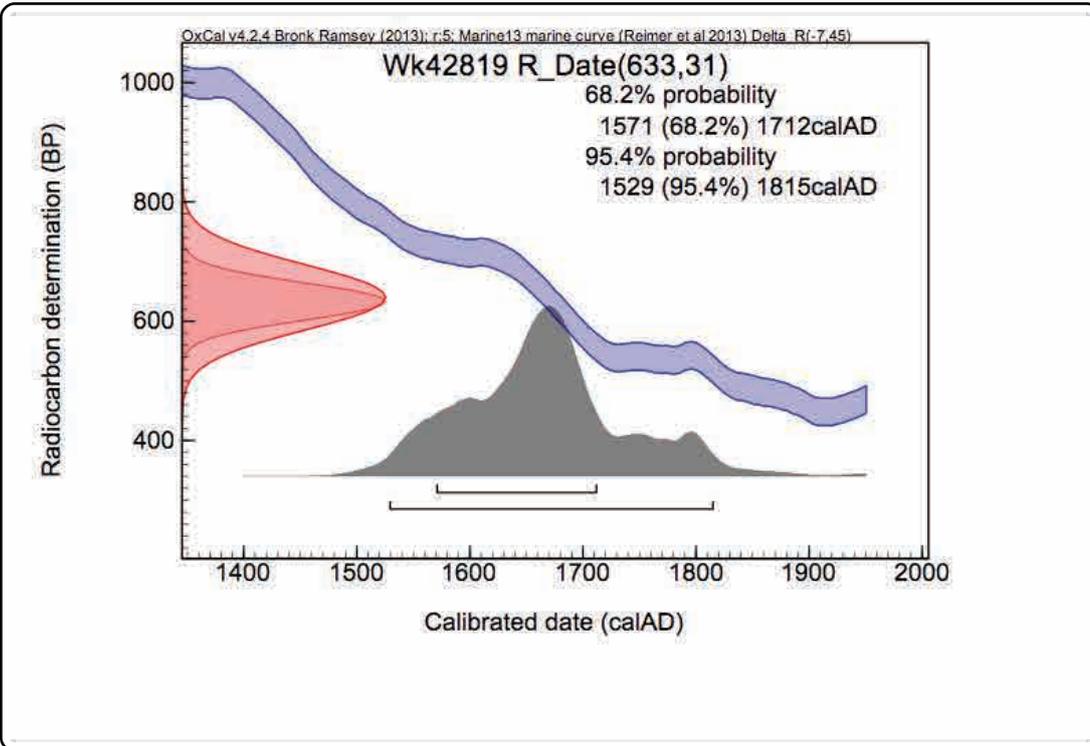
Tuesday, 15 December 2015

Report on Radiocarbon Age Determination for Wk- 42819

Submitter	M Campbell
Submitter's Code	F5
Site & Location	Leinster Ave, Mt Maunganui, New Zealand
Sample Material	Paphies australis
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	1.4 ± 0.2 ‰
D ¹⁴ C	-75.8 ± 3.6 ‰
F ¹⁴ C%	92.4 ± 0.4 %
Result	633 ± 31 BP

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO₂.
- F¹⁴C% is also known as *Percent Modern Carbon (pMC)*.

Ali Hogg

APPENDIX B CHARCOAL ANALYSIS

Charcoal Identification, Leinster Ave. (S11/363) Mount Maunganui

Report to Matt Campbell – mat.c@cfgheritage.com
CFG Heritage, 132 Symonds St, Eden Terrace
PO Box 10 015, Dominion Road, Auckland 1024

Rod Wallace 6th December 2015

Introduction

Eight bags of charcoal from excavations Leinster Ave. (S11/363) Mount Maunganui were submitted for identification and report. The results are given below.

Feature 1

Not charcoal – probably coke

Feature 4

Totara	10
--------	----

Feature 5

Tutu	3
Hebe	12
Olearia	4
Manuka	16

Bitumen coated piece of road metal

Feature 6

Coprosma	1
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Feature 7

Tutu	2
Hebe	9
Coprosma	3
Olearia	5
Manuka	2

Feature 8a

No identifiable material

Feature 10

Hebe	1
Pohutukawa	1

Feature 14

Coprosma	2
Manuka	9
Puriri	1

Discussion

Shrub and scrub species dominate plus some puriri and pohutukawa except for feature 4 where what was possibly a single piece of charred totara was found.