

Supplement 3:

**Radiocarbon dates for grid units E391-392 N402-403 of the Ha'atuatua
archaeological site, Marquesas Islands (East Polynesia)**

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Supplementary Information for "Polynesian settlement of the Marquesas Islands:
The chronology of Hanamiai in comparative context"

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1. Introduction

Radiocarbon dating of an articulated seabird (*Puffinus pacificus*) skeleton helps to constrain age estimates for initial Polynesian settlement of the Ha'atuatua Dune. The skeleton was discovered in a mainly culturally-sterile dune deposit lying just below the level of the Archaic era occupation.

Puffinus pacificus, the wedge-tailed shearwater, is exceptionally vulnerable to predation by humans and the Polynesian-introduced rat. This is because shearwaters nest in shallow burrows, they return to the same nest site every year, they lay only a single egg, and the parents spend an average of 53 days on the egg during incubation (Byrd et al. 1983). Evidence from archaeological sites across the Marquesas and elsewhere in the Pacific indicates that Polynesian colonization caused shearwater populations to move their nesting grounds to uninhabited, inaccessible settings. Today in the Marquesas, the species nests only in areas such as uninhabited offshore islets or inaccessible cliff faces. The Ha'atuatua shearwater skeleton, which was discovered complete and articulated, apparently represents an individual that died in its burrow. Because of the vulnerability of shearwaters to humans and rats, the Ha'atuatua skeleton very likely dates to before Polynesian colonization of the dune or a time within the first few decades of settlement.

The *P. pacificus* skeleton was discovered in 1994 during a field season directed by Barry Rolett with the assistance of Jennifer Kahn, Mayumi Ishimaru Rolett, Tana Timau and Aka Teiefitu. Continuing earlier work (Rolett and Conte 1995), the 1994 field season included a 4 m² excavation at an area 95 m south of Suggs' (1961) Location A, 15 m from

the north bank of the southernmost river traversing the dune, and 45 m inland from the steep escarpment at the dune face. See the Ha'atuatua Dune map by Rolett and Conte (1995:Fig. 2) for reference points. In the supplement, we refer to this location as the southern main dune. Using the grid established in 1992, coordinates for the 4 m² excavation area are E391-392 N402-403. The dune elevation at this area is 8 m above the mean maximum high tide line.

2. Stratigraphic context

As shown in a profile drawing of the E391 N403 west wall (Figure 1) the stratigraphy consists of three deposits. Layer A is the present-day dune surface. It contains very little cultural material and is about 15 cm thick. Layer B, around 30 to 40 cm thick, is a dark charcoal-stained sandy deposit notable for its high organic content, as well as some shell and bone midden, together with small numbers of artifacts including worked pearl shell, stone debitage flakes, coral files and fishing weights. The high organic content and charcoal-staining are consistent with the interpretation that Layer B, as exposed in this part of the dune, is related to Layer B found at Location A and the Central Dune. At around 820 cmbd Layer B is marked by a thin burnt surface extending over much of the 4 m² excavated area. This represents a discrete occupation level associated with two features: Feature 31, a possible earth oven; and Feature 29, a localized concentration of charcoal. Our 4 m² excavation at the southern main dune did not yield chronologically diagnostic artifacts, however Layer B artifact assemblages from Location A and the Central Dune are clearly early (Archaic).

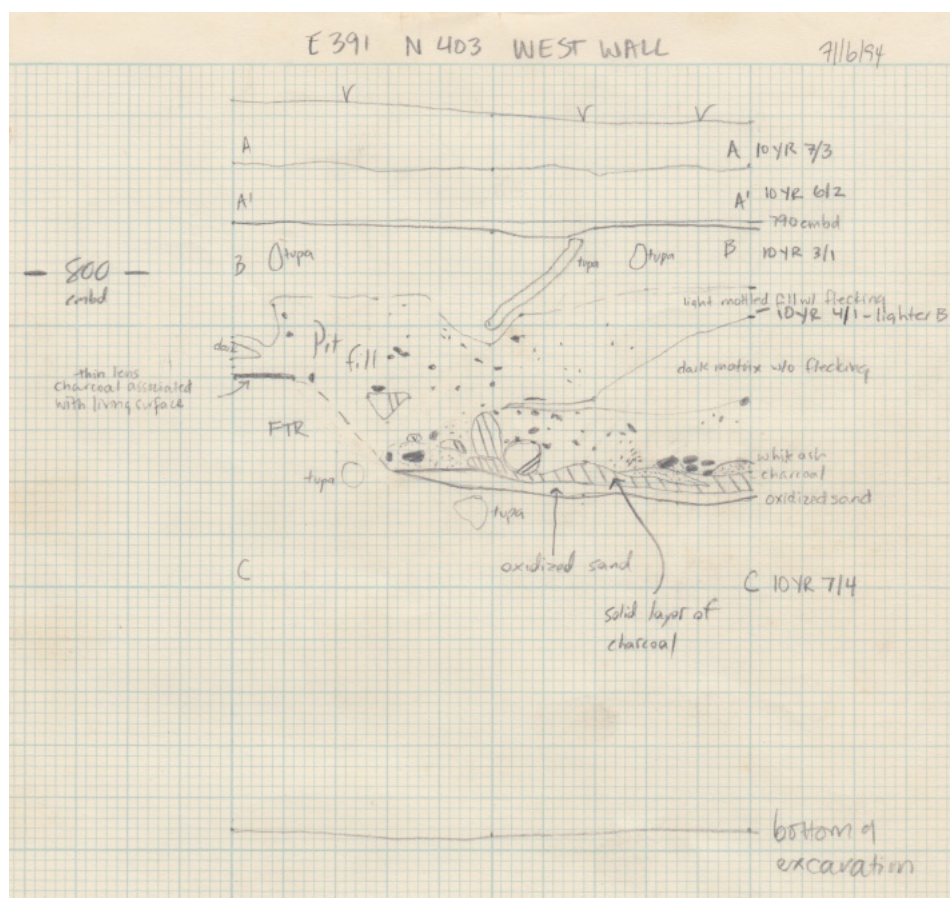


Figure 1. West wall profile drawing of square E391 N403. By Jennifer Kahn and Barry Rolett.

Layer C consists of a light-colored sand matrix containing some charcoal flecking and isolated artifacts but these are mainly found near the Layer B interface. Given the presence of a basin-shaped pit (Feature 30) dug from the bottom of Layer B into Layer C, and clear evidence of disturbance by crabs, it is likely that the small amount of cultural material recovered from Layer C is intrusive from Layer B. Layer C gradually transitions to a sand matrix with no cultural material at all – this apparently represents the pre-Polynesian colonization dune. Layer C yielded no combustion structures and only scattered charcoal flecking. The *P. pacificus* skeleton was found 10-15 cm below the Layer B/Layer C interface.

The same basic stratigraphic sequence is encountered across the Ha'atuatua Dune, from Location A and the Central Dune to the 4 m² excavation area: 1) a surface deposit (Layer A) underlain by 2) a rich, charcoal-stained deposit (Layer B) with numerous intact features (combustion structures, pavements, pits and postholes) indicating an intensive occupation that likely covered an area of 4000 m² or more, and 3) a light-colored deposit containing scattered charcoal flecking and isolated artifacts that transitions to the pre-Polynesian colonization dune.

3. Radiocarbon samples

The stratigraphic sequence for the 4 m² excavation area is dated by three radiocarbon samples. Information about these samples is as follows:

Beta-81346 (HTT Accession # 5498). Unidentified wood charcoal. Analyzed in 1995.

Radiocarbon sample Beta-81346 was collected from Feature 29, a concentrated accumulation of charcoal covering an area measuring around 35 cm by 90 cm at a depth from 812 - 822 cmbd in Layer B. Unlike Feature 31 (see below) which is characterized by clear evidence for in situ burning, the evidence for Feature 29 is ambiguous. The charcoal concentration itself is clearly defined but there was no visible burnt surface, which in other areas is identified by a thin layer of red oxidized sand. Thus Feature 29 most likely represents rake-out from Feature 31 or another nearby combustion structure. Sample Beta-81346 consists of 350 g of sand mixed with unidentified wood charcoal collected in situ. The sample includes some chunks but it is mostly crushed charcoal and sand.

Beta-81347 (HTT Accession # 5519). Unidentified wood charcoal. Analyzed in 1995.

Radiocarbon sample Beta-81347 was collected from the burnt surface of Feature 31, a possible earth oven visible in the E391 N403 West wall profile. Feature 31 is associated with the 820 cmbd occupation level within Layer B. The feature is basin-shaped with oxidized sand and thick layers of charcoal and ash at the bottom, but only small numbers of fire cracked stones. Sample Beta-81347 consists mainly or exclusively of unidentified wood charcoal from a single "log" fragment ca. 5 cm diameter. Other smaller charcoal chunks, possibly from the same log, were also collected but it is not clear from the notes if these were submitted together with the single large fragment. Weight of the charcoal sample submitted is 345 g.

Beta-140699 (HTT Accession # 5564). Bone collagen. Analyzed in 2000.

Material: 3 bones from the articulated skeleton of a single wedge-tailed shearwater (*Puffinus pacificus*) found in a collapsed burrow.

Grid coordinates: E391.75-88 N402.93 - 403.05.

Elevation: 834 cmbd.

The articulated skeleton was discovered intact and collected *in situ* at 10-15 cm below the Layer B/Layer C interface. The skeleton was found in the vicinity of a basin-shaped pit (Feature 30) dug from the bottom of Layer B into Layer C but it was not deposited in the pit. Rather, the skeleton apparently represents a seabird that died in its burrow before Polynesian colonization of the Ha'atuatua Dune or during the first few decades of settlement.

4. References

Byrd, G.V., D.I. Moriarty and B.G. Brady. 1983. Breeding biology of wedge-tailed shearwaters at Kilauea point, Hawai'i. *Condor* 83:292–296.

Rolett B.V. and Conte E. 1995. Renewed investigation of the Ha'atuatua dune (Nukuhiva, Marquesas Islands): A key site in Polynesian prehistory. *Journal of the Polynesian Society* 104(2):195-228.