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Defining the Lau Context:
Recent Findings on Nayau, Lau Islands, Fiji

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ABSTRACT

We present analyses of reconnaissance surveys, test excavations, stratigraphy, chronology, material culture, and faunal remains from 14 archaeological sites on Nayau, Lau Islands, Fiji. We found Lapita pottery on sand dunes along the southeast coast of the island. Although this site was not stratigraphically excavated or dated, our survey and test excavations of the surrounding area indicate that Lapita-period subsurface deposits are intact and widespread. Elsewhere, we obtained six AMS radiocarbon dates from bones recovered in test excavations at various site types and locations. None of the dated samples is older than *ca*. 710 cal BP. This chronology, combined with the presence of the Lapita site and survey data, suggests that human occupation of Nayau was continuous since Lapita times. Like Lakeba (Best 1984), Nayau incorporates all ceramic and cultural phases previously defined for Fiji. We suggest that archaeological data from Nayau are critical to understanding patterns of prehistoric contact and change in Lauan and Fijian society.

Keywords: NAYAU, FIJI, ZOOARCHAEOLOGY, LAPITA, LAU ISLANDS, ARCHAEOLOGY.

INTRODUCTION

The Lau Group is a cluster of 80 islands, 29 of which are inhabited today, extending north to south across 450 km of ocean (Fig. 1, which does not include Ono-i-Lau and Tuvana-i-Ra, *ca*. 200 km south of Ogea). The main Fijian islands of Viti Levu and Vanua Levu are located about 200 km west and 100 km northwest of Lau, respectively (Fig. 1). Lau lies about 320 km west of Tonga. Culturally as well as biogeographically, the Lau Islands are the meeting point between Polynesia and Melanesia. Although the precise timing and origins of the cultural relationship between Tonga and Lau remains unknown, the people of the two areas were interacting by the seventeenth century and probably well before 1000 BP (Best 1984, 1987). The seventeenth century Lauan people were intermediaries between chiefly lineages of Tonga and Fiji, and a "House of Fiji" (Ha'a Fale Fisi) was firmly established in Tonga (Hocart 1929; Reid 1990). At European contact the Lauans were engaged in exchange networks that spanned much or all of Fiji, Tonga, and Samoa (*ibid*.). Many anthropologists have suggested that Lau, and the island of Lakeba in particular, was a central political node between Polynesia and the main Fijian Islands (Hocart 1929; Roth 1953; Best 1984, 2002; Hunt 1988). Archaeological research can address this issue by providing chronological evidence that characterises social change in terms of settlement, subsistence, and other forms of material culture.

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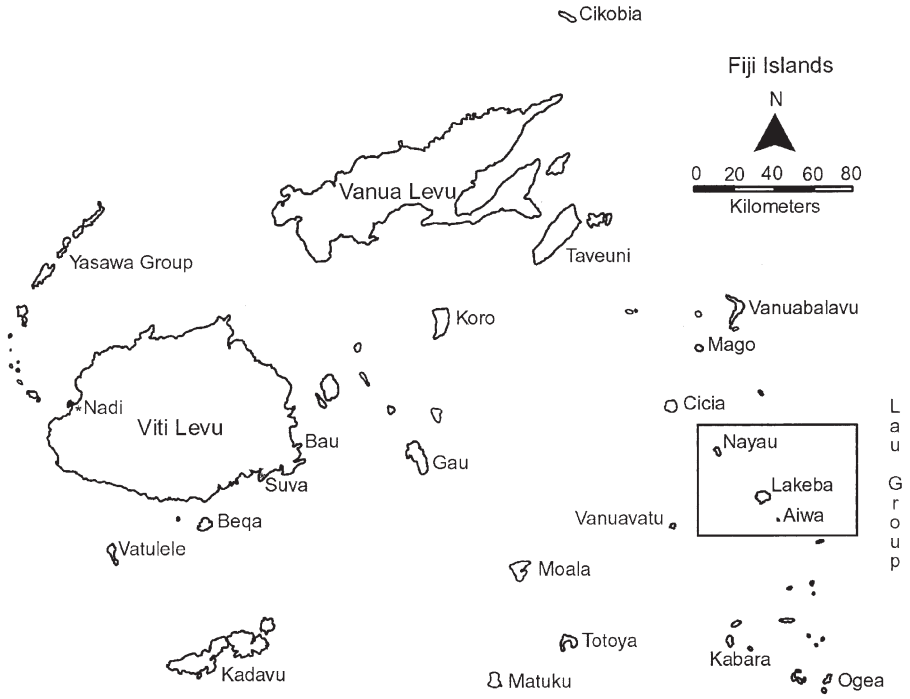

Figure 1: Fiji Islands. Lakeba, Nayau, and Aiwa are in the square at right.

The Lau archipelago therefore is ideally suited to investigate Polynesian *versus* Melanesian influences in archaeological and social phenomena. Made up of islands that vary considerably in land area, elevation, geology, and isolation, Lau also provides a setting to test inter-island variability in ancient exchange networks, production systems, and local cultural development. The extensive work by Simon Best (1984, 2002) on Lakeba (Lau's largest island) is considered to be the archaeological baseline for Lau. Nevertheless, the Lau Islands still have much to contribute to archaeological interpretations of the Fiji-Polynesia region. Best's work established that initial human colonisation of Lakeba occurred by about 2800 years BP, but a chronology of colonisation and occupation for the remainder of Lau has yet to be established. The 'Lau context' (a phrase used by one of the early reviewers of this paper) at this time essentially consists of Lakeba with little comparative archaeological information from any of Lau's 79 other islands. Therefore, the Lau context remains to be more fully explored. Recently, some archaeological work has been carried out on Mago (Clark *et al*. 2001), Vanua Balavu (Nunn 2000; Nunn and Matararaba 2000) and Yacata (Clark and Hope 2001). Through the combined efforts of these projects a picture of prehistoric life in Lau is beginning to emerge.

Our research focuses on the island of Nayau 28 km northwest of Lakeba and just 39% as large. This work seeks to understand the natural and human-induced long-term dynamics in biotic communities, as well as to explore the political and economic social forces that have engaged the people of Lau throughout their history. We employ an historical approach, incorporating paleontology, ecology, archaeology, ethnography, historical records, and oral

traditions. This report presents new data on the archaeological component of our research, including chronology, fauna, and material culture from Nayau obtained through reconnaissance surveys, test excavations, and laboratory analyses.

ENVIRONMENTAL BACKGROUND

The rock substrate that makes up the Lau Islands dates to the late Miocene, including 6–9 million year old volcanics and late Miocene, Pliocene, and Pleistocene coralline limestone uplifted to as much as 300 m above sea level (Bayliss-Smith *et al*. 1988). Some of the islands are wholly volcanic, some are entirely limestone, and others are combinations thereof (Ladd and Hoffmeister 1945; Stevenson *et al*. 1994). These islands are located relatively close together, with much inter-island visibility. The extensive reef systems that fringe most islands in Lau are rich in faunal resources (Bayliss-Smith *et al*. 1988; Wright 1993). Virtually all modern Lauan villages lie on the coast, with easy access to the sea (Hocart 1929; Thompson 1940).

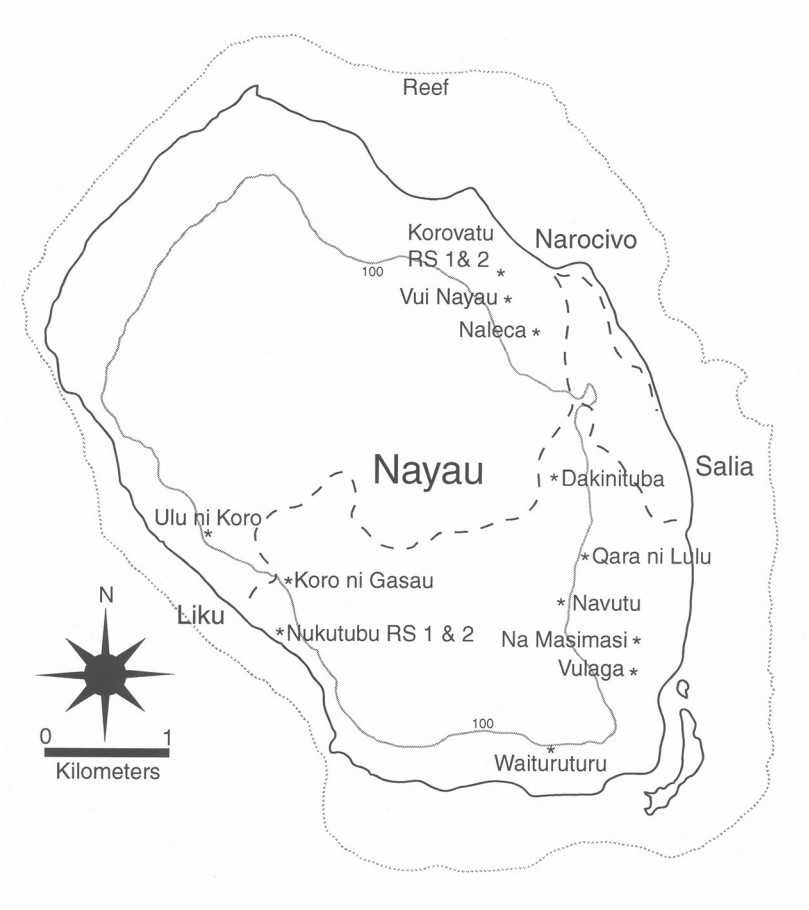

Figure 2: Nayau. The three villages are shaded; dots represent archaeological sites. The contour line is 100 m. Dashed lines are trails.

Nayau (Fig. 2) has a land area of 22 km^2 and is located in north-central Lau, about 240 km east of Viti Levu. The islands of Cicia to the northwest, and Lakeba to the southeast, are Nayau's closest neighbours. A geological composite of exposed volcanics and weathered raised limestone (Ladd and Hoffmeister 1945), Nayau's central interior zone is a basin (average elevation *ca*. 100 m) with large areas of highly degraded volcanic soils (from weathered andesitic and dacitic lavas) where sweet potatoes (*Ipomoea batatas*), yams (*Dioscorea* spp.), dryland aroids or taro (*Colocasia esculenta* and *Alocasia macrorrhiza*), and historically introduced manioc (*Manihot esculenta*) are cultivated. The basin is surrounded by a discontinuous ring of elevated reefal limestone (maximum elevation *ca*. 160 m) that varies in surface features from rugged karst outcrops to densely forested areas with substantial weathered soil.

Extensive tracts of planted and tended coconut palms (*Cocos nucifera*) ring much of Nayau's coastline. The palms produce copra, which is the main commercial export. The coastal flats and reefal sands that fringe Nayau were probably formed mainly by storm-wave deposition during the past 4000 years (McLean 1980). Like many of Fiji's peripheral islands, Nayau is subject to hurricanes and tropical storms. In 1979, for example, Hurricane Meli's wind-driven sea surges struck the northern and eastern coasts, sweeping over the eastern two villages and causing severe loss of life and landscape damage (Bayliss-Smith *et al*. 1988: 88).

Nayau's indigenous terrestrial vertebrates consist of lizards, a boa, birds, and fruit bats. Prehistoric human introductions include the chicken (*Gallus gallus*), pig (*Sus scrofa*), dog (*Canis familiaris*), and rats (*Rattus exulans, R. praetor*). Cattle (*Bos taurus*), goats (*Capra hircus*), horses (*Equus caballus*), and cats (*Felis catus*) arrived on the island in the late 1800s (Hocart 1929).

SITE DESCRIPTIONS

We worked on Nayau from 24 September to 9 November 2001. Our reconnaissance included all three traditional districts, each corresponding to a modern village (Salia, Narocivo, and Liku). The surveys located 34 discrete prehistoric archaeological sites on the island, consisting of three occupation types: inland rockshelters, hill-top fortified villages, and open village sites on the beach. Most of the 34 sites are known to the local inhabitants by the names we use here. Archaeological structures and pottery scatters were mapped, described, photographed, and plotted on air photos and geological maps. We excavated 12 sites yielding data from each of the traditional districts and each of the site types. In this paper we focus on the 12 excavated sites and 2 surface collections (Fig. 2).

EXCAVATIONS AND STRATIGRAPHY

Test excavations (Table 1) were carried out in 5–10 cm levels using trowels, following natural stratigraphy whenever possible. A permanent datum was established in each rockshelter site to provide vertical and horizontal control. All sediment was screened through nested sieves of 1/2″ (12.8 mm), 1/4″ (6.4 mm), 1/8″ (3.2 mm), and 1/16″ (1.6 mm) mesh, from which we collected shell, bone, pottery, lithics, non-local rock, and any other artefacts. We recorded our excavations on standardised field forms.

TABLE 1

Summary of excavated sites, Nayau, Lau Group, Fiji. RS = Rockshelter

District	Site Name	Abbreviation	Site Type	Excavation Method
Salia	Waiturutu East	WaiT E	Fortified rock shelter with internal platforms	1 x 1 m test unit
Salia	Waiturutu West	WaiT W	Fortified rock shelter with internal platforms	1 x 1 m test units (2)
Salia	Qara ni Lulu	Qara L	Rockshelter	1 x 1 m test unit
Salia	Vulaga	Vul	Coastal dune site	Shovel tests (15)
Salia	Navutu	Nav	Hillfort	1 x 1 m test unit (1) shovel tests (2)
Salia	Daku ni Tuba	DKT	Hillfort	1 x 1 m test units (2)
Narocivo	Korovatu RS 1	KV1	Rockshelter	1 x 1 m test unit
Narocivo	Korovatu RS 2	KV2	Rockshelter	1 x 1 m test unit
Liku	Koro ni Gasau	KoroNG	Hillfort	1 x 1 m test unit
Liku	Ulu ni Koro	UluNK	Fortified rockshelter	1 x 1 m test unit
Liku	Nukutubu RS 1	NukuT 1	Rockshelter	1 x 1 m test unit
Liku	Nukutubu RS 2	NukuT 2	Coastal dune with rock shelter	1 x 1 m test unit

Most of the excavated sites had relatively shallow deposits (< 1 m deep) with simple stratigraphy. Waiturutu West and East, Korovatu Rockshelter 2, and Nukutubu Rockshelter 2 displayed more complex stratigraphy with fine lenses, earth ovens and/or pits, and multiple strata.

Vulaga and Na Masimasi

We conducted 15 shovel tests in Vulaga, south of Salia village, along the southeast stretch of sand dunes that runs parallel to the sea. This site consists of a large surface scatter of pottery and other artefacts (measuring approximately 100 x 50 m). Shovel tests confirmed the presence of subsurface deposits under a 30–50 cm cap of more recently deposited sand. Although this site has not yet been dated (we did not recover datable material in sufficient quantity from a secure context), the dentate-stamped and red-slipped pottery, red chert, and faunal remains indicate that it is probably of early prehistoric age. Deposits extend to an average of 80 cm below the surface.

Lapita pottery was also found in surface collections in several locations at Na Masimasi, *ca*. 300 m north of Vulaga (Fig. 2). Na Masimasi is an open site on coastal sand dunes. The extensive surface scatter of artefacts extends *ca*. 360 m north to south along the dunes and then decreases moving south. The area referred to as Na Masimasi by local informants appears to grade into the area called Vulaga. Lacking a clear boundary, the names provided to us may correspond to northern and southern extents of what may be one massive pottery scatter (i.e., greater than 500 m in length, running parallel to the coastal dunes). However, all Lapita pottery we documented was from surface deposits at Na Masimasi, where several basalt, chert, and shell tools (described below) were collected. The coastal position of Vulaga and Na Masimasi are typical of Lapita sites in Fiji generally, suggesting a preferential focus on the marine environment.

Waiturututu East

The surface of our excavation unit (TP-1) at this fortified rockshelter was littered with modern rat and bird bones, apparently the result of owl roosts in the overhanging limestone outcrop that forms this large rockshelter. The subsurface deposit consists of three primary strata, designated Layers I–III (Fig. 3). Layer I is divided further by lenses of ash and charcoal. The loose, organic, pebbly, cobbly silt composing much of Layer I (Munsell 7.5 YR 3/2, dark brown, dry) yielded abundant faunal remains and material culture. We interpret Layer I as an earth oven (*lovo*) feature, based on copious whole and broken fire-cracked volcanic stones and abundant charcoal flecks and chunks.

Layer II is a relatively uniform pebbly silt with much less fire-cracked rock and very light charcoal flecking (Munsell 5 YR 4/4, reddish brown, dry). Faunal remains and artefacts are less frequent than in Layer I. Layer III is lighter in colour than overlying layers (Munsell 5 YR 4/3, reddish brown, dry). This loose, highly weathered, indurated crust contains limestone cobbles and boulders up to 40 cm in diameter. Cultural remains decrease and drop out completely in the lower level of Layer III, which represents the pre-cultural rubble underlying anthropogenic sediment.

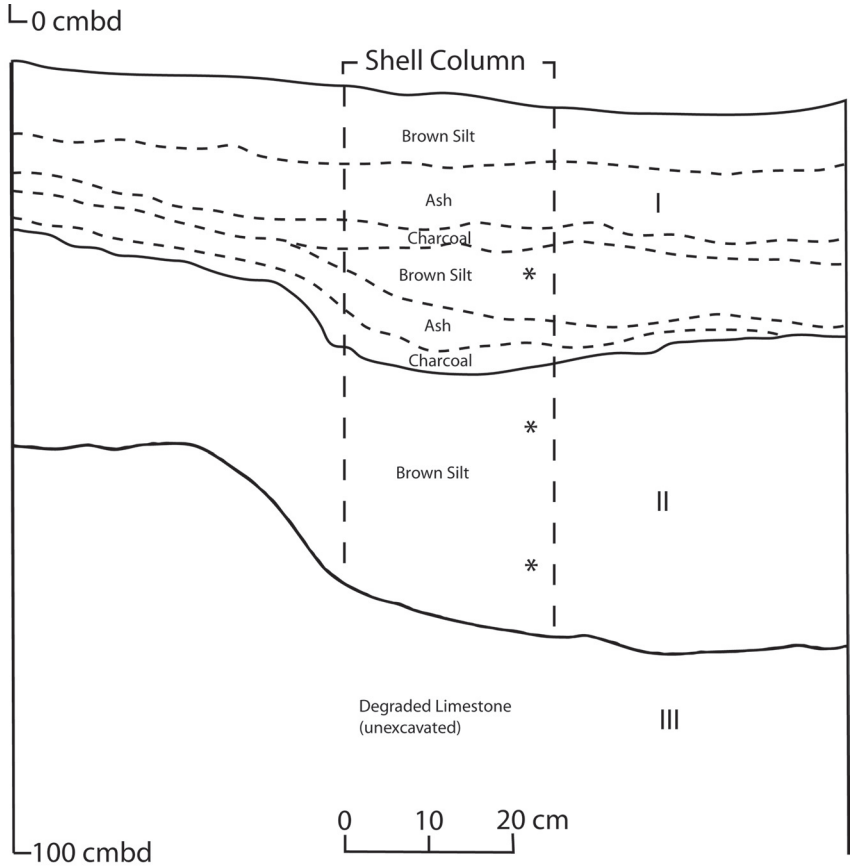

Figure 3: Stratigraphic section of south face of unit 1, Waiturututu East. * indicates the position of bone samples submitted for AMS radiocarbon dating.

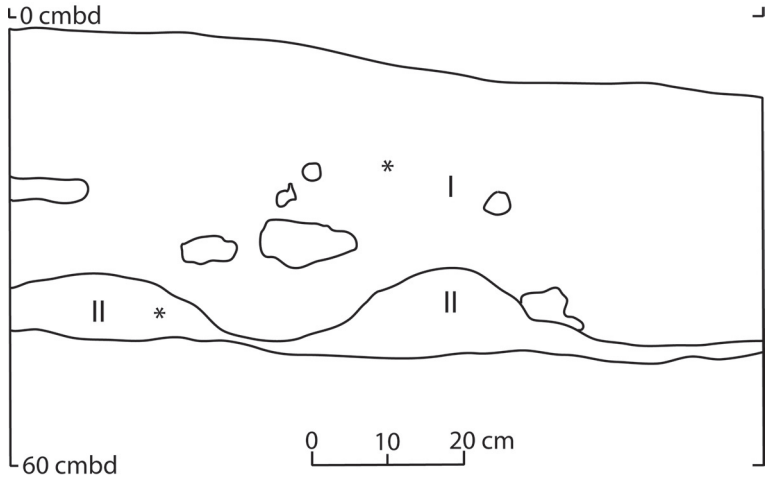

Figure 4: Stratigraphic section of the east face of unit 1, Qara ni Lulu. * indicates the position of bone sample submitted for AMS radiocarbon dating.

Qara ni Lulu

This rockshelter site consists of two primary stratigraphic layers (Fig. 4). Although the surface (littered with light shell midden and pottery fragments) was slightly disturbed by ungulates, the excavated sediment proved to be intact, if shallow (*ca*. 60 cm). Layer I is a densely packed, silty, organic deposit of limestone rubble, shell, bone, charcoal chunks, coral, chert, and pottery (Munsell 5 YR 2.5/1, black, dry). Layer II is clayier, rockier, coarser, more plastic and tightly packed, and lighter in colour than Layer I (Munsell 7.5 YR 3/2, dark brown, dry). Frequencies of pottery and midden were much less in Layer II. Weathered limestone rock increased with depth and the base of Layer III was culturally sterile.

Nukutubu Rockshelter 2

A limestone outcrop that slightly overhangs a beach dune forms Nukutubu Rockshelter 2. Erosion of the dune exposed this deposit, which consists of at least five layers (Fig. 5). The surface comprises medium-to-fine sand packed with limestone rubble and copious shell midden. Layer I, primarily sand with light silt inclusions, contains fauna, waterworn coral, pottery, candlenut (*Aleurites*) pericarps, and charcoal flecks (Munsell 7.5 YR 4/2, brown-dark brown, dry). Layer II is less silty but more pebbly (Munsell 7.5 YR 5/3, brown, dry). This coarse-grained stratum yielded copious charcoal chunks with a fine lens of charcoal at the base. Bone (including cat), shell, pottery, and a rusty metal ring were recovered from Layer II.

Layer III is more pebbly and cobbly and contains more bone (especially of bats). This sandy sediment has charcoal flecks, waterworn coral, and shell (Munsell 7.5 YR 3/2, dark brown, dry). The deposit at this point appeared to be undisturbed. Waterworn coral steadily

increases throughout Layer III, making an abrupt transition to Layer IV, which is darker in colour with increased charcoal flecking. Layer IV is a very fine sand with abundant limestone pebbles and cobbles (Munsell 7.5 YR 4/3, brown-dark brown, dry). Within Layer IV was a flexed adult human burial, which we drew and photographed *in situ*. We discontinued excavations at this point, approximately 53 cm below surface, although the cultural deposit continued below the burial. We did not attempt to expose the entire skeleton but the position of the lower body suggested that the burial was facing west in an undisturbed context. We covered the burial with clean sand and reinforced the excavation wall with rocks to prevent further erosion or other disturbance.

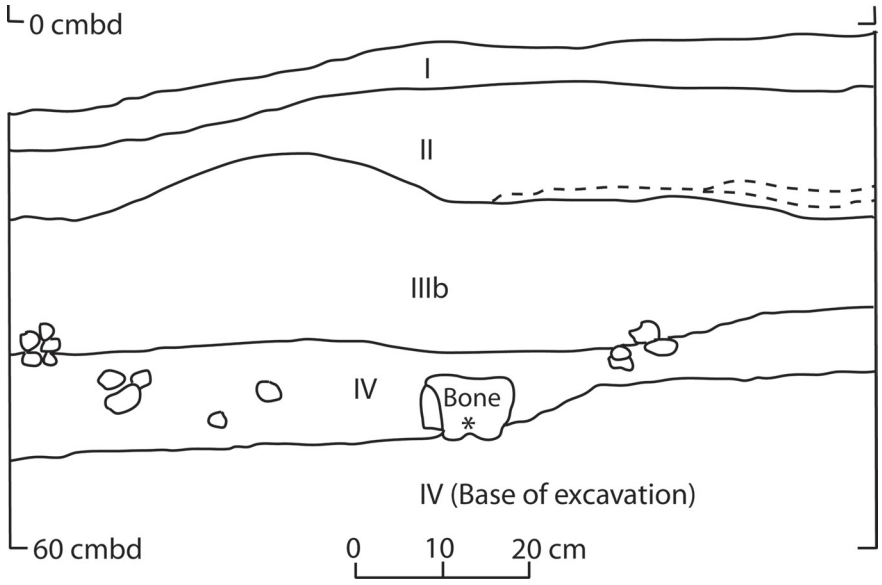

Figure 5: Stratigraphic section of the north face of unit 1, Nukutubu Rockshelter 2. The * indicates the position of bone sample submitted for AMS radiocarbon dating.

TABLE 2

AMS radiocarbon dates from Nayau, Fiji. Each determination (by Beta Analytic Inc., Miami, Florida) is on a single bone. The conventional ^{14}C age is adjusted for $^{13}C/^{12}C$ ratios (Stuiver and Polach 1977). Calibration for atmospheric variation in ^{14}C follows OxCal version 3.3.

Beta No.	Material	Site	Layer/Level	Measured age	$^{13}C/^{12}C$ (‰)	Conventional age	cal BP (2σ)
164249	coracoid *Gallus gallus*	WaiT E	I/1	470±40	-19.5	560±40	650–580 (.50) 570–510 (.45)
164248	tarsometatarsus *Ptilinopus porphyraceus*	WaiT E	II/2	490±40	-21.1	550±40	650–580 (.43) 570–510 (.52)
164247	radius *Pteropus samoensis*	WaiT E	II–III/3	610±40	-19.9	690±40	690–620 (.58) 610–550 (.38)
164253	adult tibia *Homo sapiens*	Qara L	I/2	550±40	-15.7	700±40	710–620 (.65) 610–550 (.30)
165468	radius *Pteropus tonganus*	NukuT 2	II–III/3	100.6±0.8% modern C	-19.2	50±60	280–180 (.28) <150 (.68)
173059	metatarsal *Homo sapiens*	NukuT 2	IV/1	280±40	-16.6	420±40	540–420 (.80) 380±320 (.16)

RADIOCARBON DATING AND CHRONOLOGY

We have begun to develop a chronology for Nayau by obtaining accelerator-mass spectrometer (AMS) radiocarbon (^{14}C) dates from six bone samples from Waiturututu East, Qara ni Lulu, and Nukutubu Rockshelter 2 (Table 2). None of the dated samples is older than *ca*. 700–600 cal BP. Because AMS ^{14}C dates on identified bone can be more reliable than those on unbound fragments of unidentified wood charcoal (Steadman *et al*. 2000, 2002), we believe that the six dates provide a reliable starting point for developing Nayau's cultural chronology. In particular, these determinations help to establish a late prehistoric context for the island and the Lau region.

The three ^{14}C samples from Waiturututu East indicate that occupation of this inland fortified rockshelter was confined to a relatively short period during the late prehistoric phase, *ca*. 690–510 cal BP. These dates agree with Best's findings on Lakeba, where inland fortified sites are dated from *ca*. 1200 to 200 cal BP; Best refers to this as the 4th and 5th stages of the culture history sequence, corresponding with his Period III and IV ceramic assemblages (1984: 644–645, 2002: 17–23). Settlement during this phase is characteristically focused on fortifications and also correlates with late Navatu and Vuda ceramic styles, which are argued to represent a major cultural shift (Hunt 1986, 1987; Clark 1999; Marshall *et al*. 2000) that may involve contact from the West, especially Vanuatu (Best 1984, 2002; Burley n.d.).

The single ^{14}C date from Qara ni Lulu, based on an adult human tibia (not in a primary burial context), suggests late prehistoric occupation at 710–550 cal BP. Additional evidence for late occupation at this inland rockshelter comes from the elaborate incised and punctated design motifs on the pottery (typical of the Vuda and later Ra pottery styles that date to *ca*. 900–100 BP on Viti Levu and Taveuni (Green 1963; Marshall *et al*. 2000). On Lakeba the gradual introduction of incised elements characteristic of Vuda ceramics occurred a few hundred years earlier than on the larger Fijian islands (Best 1984). Our AMS ^{14}C date for Qara ni Lulu is several centuries earlier than dates generally associated with Ra style pottery (200–100 BP), which also parallels the Lakeba situation.

The Nukutubu Rockshelter 2 ^{14}C date, which is no older than 280–180 cal BP, was from the radius of a fruit bat (*Pteropus tonganus*) in Layer III. The date suggests occupation of the site during the proto-historic period. A right 4th metatarsal from the human burial, undisturbed and confined to Layer IV, yielded an older age of 540–420 cal BP, thus placing the burial in the mid-late prehistoric phase.

Although the material culture and survey data, in particular the site yielding Lapita pottery, suggest that prehistoric occupation of Nayau spanned almost 3,000 years, the current ^{14}C chronology extends only to *ca*. 700–600 cal BP. Future research will focus on excavating and/or dating sites within this hiatus of 2000+ years.

THE MATERIAL CULTURE SEQUENCE: POTTERY AND ARTEFACTS

The Nayau artefact assemblage was dominated by pottery (96% by count; Table 3), with non-ceramic prehistoric artefacts such as basalt and shell adzes, chert flakes, bivalve scrapers, worked bone and shell, coral files, and other classes of material culture totalling only 49 items. Both historic-period artefacts (fragments of metal and glass) were recovered from disturbed contexts at Daku ni Tuba and Nukutubu Rockshelter 2. While none of the excavated units had stratigraphic sequences sufficient to detect stylistic changes, certain

TABLE 3

Numbers of prehistoric artefact classes by site, Nayau, Lau Group, Fiji.
Site abbreviations are given in Table 1.

Artefact Class	**WaiT W**	**WaiT E**	**KV 1**	**KV 2**	**UluNK**	**KoroNG**	**NukT1**	**NukT2**	**QaraL**	**VNay**	**Vulaga**	**NaMM**	**DKT**	**Naleca**	**Total**
POTTERY	58	29	137	266	4	153	2	17	101	1	127	50	183	15	1143
BASALT TOOLS															
Complete adzes	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Adze fragments	-	-	-	-	-	-	-	-	-	1	1	1	-	1	4
Adze preforms	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Adze flakes	1	-	-	-	-	-	-	-	-	-	-	1	-	-	2
Other lithics & fragments	-	-	-	-	-	-	-	-	-	-	-	2	-	1	3
CHERT															
Red chert flakes	-	8	5	-	-	-	-	-	1	-	3	3	-	-	20
Debitage or flake fragments	-	-	1	1	-	-	-	-	1	-	3	1	-	-	7
SHELL TOOLS															
Tridacna adzes	-	1	-	-	-	-	-	-	-	-	1	-	-	-	2
Bivalve scrapers	1	1	-	-	-	-	-	-	1	-	-	-	-	-	3
OTHER															
Worked bones	-	1	-	-	-	-	-	-	-	-	-	-	1	-	2
Worked shells	-	-	-	-	-	-	-	-	1	-	-	-	-	1	2
Coral files	-	-	-	-	-	-	-	-	1	-	1	-	-	-	2
TOTAL	**60**	**41**	**143**	**267**	**4**	**153**	**2**	**17**	**106**	**2**	**137**	**58**	**184**	**18**	**1192**

artefact classes and types were associated with specific occupation or site types. For example, red-slipped and dentate-stamped Lapita pottery and large numbers of red chert tools were found only on the open coastal dune site of Na Masimasi, whereas ceramics characteristic of the later period were recovered from the surface of fortified inland sites and in excavated deposits.

Pottery

Pottery was recovered from all excavated sites and was either collected or noted in surface scatters at every other site identified on Nayau (1,143 sherds in total). Of particular significance are the 50 rim sherds from Na Masimasi (Fig. 6). Most of these red sherds are slipped and decorated with a relatively simple dentate-stamped design characteristic of Eastern Lapita pottery (or late Lapita). A single fragment of a dentate-stamped baked-clay object also was recovered (Fig. 7). This object, a rare find in the Pacific islands, has circular designs that may represent stylised eyes. It is also remarkably similar in form and design to a clay figurine that Green (1979: Fig. 1-2) described from the Reef Island Lapita site in the Santa Cruz group. He suggested that the decorations on this anthropomorphic figurine represent a tattoo on the buttocks, an interpretation that may apply as well to the Nayau object.

The pottery recovered from sites other than Na Masimasi is typical in form and decoration to that of Fiji's later period Navatu, Vuda, and Ra ceramic phases. It is currently under study by S.J. O'Day and P. O'Day, who will present a more detailed analysis in the future.

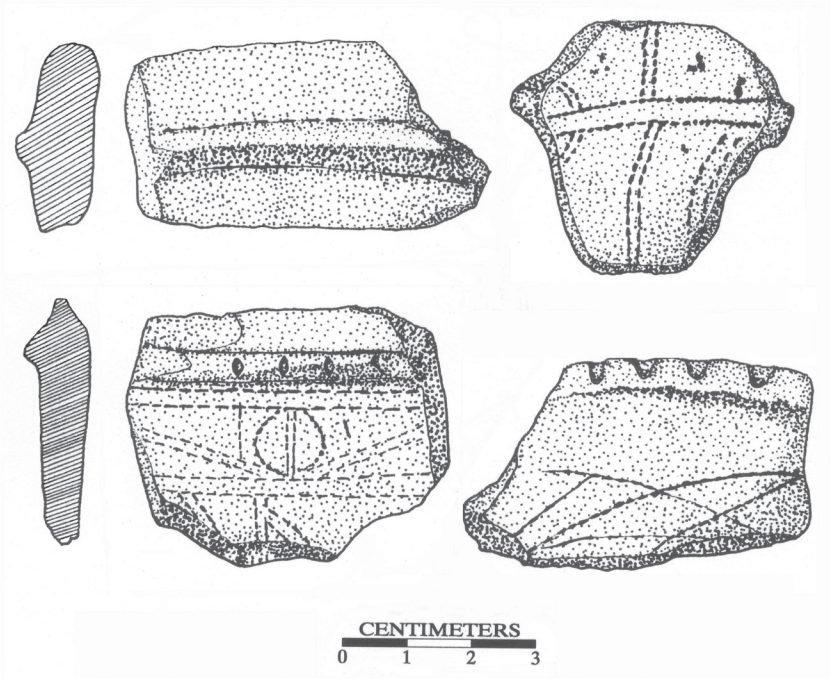

Figure 6: Selected sherds of Lapita pottery collected from the surface at Na Masimasi, Nayau.

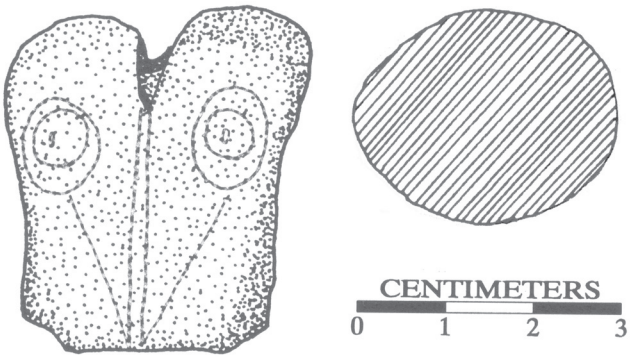

Figure 7: Baked clay object from surface at Na Masimasi, Nayau.

Surface collections on the hillforts of Daku ni Tuba and Navutu produced sherds with incised designs, punctations, and elaborate rim decorations (tool-impressed lips and nubbins) similar to those illustrated in Birks (1973: Figs 39–44; pp. 130–137). Such pottery is characteristic of the Navatu Phase on Viti Levu (Green 1963). The excavated pottery is largely undiagnostic and fragmentary, with the exception of a high frequency of sherds from Qara ni Lulu with punctations and appliqué typical of Vuda and Ra phases.

Adzes and Stone Tools

Most of the adzes (including preforms, fragments, and flakes) are polished, fine-grained greyish or blue-black volcanics with significant variation in petrology evident in hand specimens. Detailed data on rock types and chemical analyses will be presented in a later publication. The adzes display several different cross-sections. Although the Nayau assemblage of whole adzes and diagnostic adze fragments is small, it resembles material from Lakeba described by Best (1984), whose adze typology is essentially a modified version of that proposed by Green and Davidson (1969), and similar to that used by Kirch (1988). Best found that adze cross-sections of Types I to III (round to plano-convex) were frequently associated with early period sites (1984: 397, 2002: 23). In particular, Type III (elongate plano-convex) occurred in Lapita period open sites. On Nayau, we recovered a large (10 x 5 cm) fragment of a Type III adze at Na Masimasi associated with Lapita pottery. From nearby Vulaga, we recovered an adze preform (13.5 x 7 cm) of Type V–VI (triangular to trapezoidal). Such 'Samoan style' adzes from Lakeba were sourced using chemical analysis (X-Ray Fluorescence) by Best (1984, 2002), who found that this material grouped with Samoan basalts. The complete adze from Waiturututu East is a fully ground, thin, bevelled rectangular form (Type X–XI), which Best found to be common in middle-to-late prehistoric fortified sites on Lakeba. In summary, the adze typologies lend further support for the site chronologies at Na Masimasi, Vulaga, and Waiturututu.

No obsidian or volcanic glass was collected from excavations on Nayau, although we did document its presence in surface scatters at both Na Masismasi and, in a relatively high frequency, on the inland fortified site of Navutu. On Lakeba, Best (1984: 434, 2002: 23)

found obsidian in early period sites (sourced to Tonga) and later period sites (sourced to Vanuatu), but generally not in sites of intermediate age. The Nayau site of Navutu had obsidian associated with a large surface scatter of incised, rim-notched, and cord-wrapped paddle-impressed pottery, characteristic Navatu ceramics. While we have yet to source the obsidian from Nayau, its presence at Navutu lends support for the idea that Navatu style pottery and obsidian accompanied a major settlement shift from coastal to inland fortified locations by the mid-late prehistoric periods.

Red chert flakes are fairly common on Nayau. They were especially abundant as surface scatter (mostly uncollected) at Na Masimasi. All of the chert recovered in excavations was small (ranging in length from 1.5–2 cm), whereas the surface collected chert at Na Masimasi was from 2.5 to 6.5 cm long. The latter material also exhibits features (e.g., bifacial flaking) indicating that these are formal tools rather than expedient flakes and debitage. Best (1984: 416) argued that siliceous rock on Lakeba (associated with Lapita sites) may have been imported from Vanuabalavu, the only known source of high quality silicified coral in Lau. On Nayau we searched for a local source of chert, but were unable to locate one. Local informants claimed that no such source was found on the island.

The lithic assemblage from Nayau has much potential to inform about prehistoric inter-island movement and exchange of chert and volcanic rock. Potential sources of fine-grained basalt on Nayau are limited, given the highly weathered state of the volcanic rock; any source probably would be confined to the few dike exposures in streambeds (local informants were unaware of such). We will pursue the issue of inter-island lithic exchange in the future through geochemical analyses.

Shell Tools

We found two Tridacna adzes, made of the hinge region of giant clam shell, and three bivalve scrapers. Both adzes (one from Waiturutu East, the other from Na Masimasi) are complete, entirely ground, stepped-oval in cross-section, and rather small (9 x 4.5 cm and 7 x 4 cm). Such adzes may have been used to clear small gardens (Kirch 2000: 87). Hinge-region adzes are the dominant form from early contexts on Tikopia and Niuatoputapu, and are often associated with Lapita ceramic assemblages in the southeastern Solomons, Vanuatu, and Western Polynesia (Kirch 1988; Kirch and Yen 1982).

The three marine bivalve shells with definite fracturing and use wear along their dorsal margins are *Fragum fragum*, *Asaphis* sp., and an unidentified species. These small expedient scrapers range from 2 to 5 cm in length and 2 to 4.5 cm in width.

THE VERTEBRATE FAUNAL SEQUENCE

The Nayau sites yielded a rich assemblage of well-preserved bones (Table 4). A small percentage (2.5%) of the 5,889 individual specimens display obvious evidence of human induced alteration such as burning and cut marks. Burned bones were generally recovered from earth oven features.

TABLE 4
Distribution of selected classes of vertebrates (NISP) from excavated sites, Nayau, Lau Group, Fiji
Site abbreviations are given in Table 1

Class	WaiT W	WaiT E	KV 1	KV 2	UluNK	KoroNG	NukuT 1	NukT 2	QaraL	Navutu	Vulaga	DKT	Total NISP	Total Sites
Fish	1329	624	10	265	8	36	9	28	47	18	73	599	3046	12
Lizard/Snake	199	4	-	-	6	7	-	-	-	-	-	2	218	5
Sea Turtle	-	-	-	1	-	-	-	-	-	-	-	-	1	1
Bird	138	15	-	1	30	1	-	-	-	-	-	3	188	6
Bat	9	-	-	7	4	5	-	20	-	-	1	12	41	7
Rat	1644	76	2	5	415	11	-	2	3	-	-	1	2159	9
Dog	-	-	-	-	-	-	-	1	1	-	-	-	2	2
Cat	-	-	-	4	-	-	-	-	-	-	-	-	4	1
Human	1	4	10	-	2	9	2	101	68	-	1	1	199	10
Med. Mammal	-	-	-	3	-	-	2	-	-	-	-	12	17	3
TOTAL	**3320**	**723**	**22**	**286**	**465**	**69**	**13**	**152**	**119**	**18**	**75**	**630**	**5875**	**12**

TABLE 5
Summary of all fish bone from excavations of 12 sites on Nayau, Lau Group, Fiji.

TAXON	**NISP**	**Mass (g)**
Acanthuridae	179	16.1
Acanthurus sp.	37	2.9
Balistidae	104	17.3
Belonidae	6	0.7
Bodianus sp.	7	1.0
Carangidae	3	1.7
Caranx sp.	3	2.7
Carcharhinidae	1	0.2
Cephalopholis sp.	4	1.6
cf. Pleuronectidae	1	0.4
Cheilinus sp.	1	0.5
Diodon hystrix	16	5.0
Diodon liturosus	32	2.6
Diodon sp.	55	16.2
Epinephelus merra	18	1.9
Epinephelus sp.	3	0.7
Exocoetidae	2	0.1
Gymnothorax sp.	2	0.2
Halichoeres sp.	1	0.1
Labridae	7	0.9
Lethrinidae	12	5.3
Lethrinus harak	4	3.8
Lethrinus sp.	6	4.4
Lethrinus erythropterus	1	1.2
Lutjanidae	1	-
Lutjanus sp.	1	0.2
Monotaxis granoculis	3	6.6
Mullidae	7	0.6
Muraenidae	8	0.9
Myrpristis sp.	1	0.1
Naso sp.	8	0.6
Osteichthyes	2380	128.2
Ostraciidae	4	1.5
Perciformes	12	1.2
Pleuronectidae	2	0.5
Scaridae	4	1.4
Scarus sp.	42	11.9
Scombridae	2	0.2
Serranidae	35	3.9
Siganus sp.	5	0.3
Sparisomatinae	7	3.9
Sufflamen sp.	18	6.0
Tylosurus crocodilus	1	-
TOTAL	**3046**	**255.2**

Fish

Fish represents 52% of all bone recovered from Nayau by count (NISP), weighing a total of 255.2 g (Table 5). Inter-site variation in fish remains is minimal for taxonomic composition, even though Waiturututu East and West contributed 80% of the total fish NISP. Korovatu Rockshelter 2 contributed 11%. The other nine sites yielded comparatively few fish bones.

The fish assemblage reflects a heavy reliance on near-shore reef fishes, especially in the families Acanthuridae, Balistidae, Diodontidae, Lethrinidae, Scaridae, Serranidae, and Labridae. These families make up 93% of the identified Nayau assemblage by count or weight (Table 6). At the family level of identification this assemblage resembles other prehistoric Oceanic assemblages (e.g., Butler 1994; Green 1986). Fishes that typically inhabit the offshore area and pelagic zone, including tunas (Scombridae) and flyingfishes (Exocoetidae) were represented by only four bones (<0.1%).

TABLE 6

Family-level summary of fish bone from 12 sites on Nayau, Lau Group, Fiji
Based on data in Table 5, excluding Osteichthyes and Perciformes

Family	**Common name**	**NISP**	**% NISP**	**Mass (g)**	**% Mass**
Acanthuridae	Surgeonfishes	224	34	19.6	16
Balistidae	Triggerfishes	122	19	23.3	19
Belonidae	Needlefishes	7	1	0.7	1
Carangidae	Jacks	6	1	4.4	4
Carcharhinidae	Requiem sharks	1	<1	0.2	<1
Diodontidae	Porcupinefishes	103	16	23.8	19
Exocoetidae	Flyingfishes	2	<1	0.1	<1
Holocentridae	Squirrelfishes	1	<1	0.1	<1
Labridae	Wrasses	16	3	2.5	2
Lethrinidae	Emperors	26	4	21.3	16
Lutjanidae	Snappers	2	<1	0.2	<1
Mullidae	Goatfishes	7	1	0.6	<1
Muraenidae	Moray eels	10	2	1.1	1
Ostraciidae	Trunkfishes	4	<1	1.5	1
Pleuronectidae	Flounders	3	<1	0.9	1
Scaridae	Parrotfishes	53	8	17.2	14
Scombridae	Tunas	2	<1	0.2	<1
Serranidae	Groupers	60	9	8.1	7
Siganidae	Rabbitfishes	5	1	0.3	<1
TOTAL		**654**	**100**	**126.1**	**100**

Remains of Emperor fishes (Lethrinidae) were common. On Nayau today, Emperors typically inhabit the shallows around inshore seagrass beds and sandy bottoms adjacent to coral reefs, either in small schools or alone. A favoured food of Nayau's inhabitants, Emperor fishes are often targeted by inshore netting. The three species identified (*Lethrinus*

harak, *L. erythropterus*, and *Monotaxis granoculis*) are frequently caught using this method as are the acanthurids, scarids, labrids, and balistids identified in the bone assemblage.

Reptiles

Sea turtles, lizards, and snakes make up a minor portion of the bone assemblage (3.7% by NISP). Most specimens represent small lizards, currently under study by G. K. Pregill. The lizard remains, mainly from Waiturutu West, probably reflect commensal species or barn-owl prey remains rather than animals taken for food by people. One fragment of sea turtle (Cheloniidae) was identified from Korovatu Rockshelter 2. According to ethnographic and traditional accounts, sea turtle was a highly valued commodity, primarily consumed by the chiefly and elite class (Hocart 1929; Thompson 1940). Even today captured sea turtles are usually given to village chiefs. Thus, the paucity of sea turtle remains in post-Lapita archaeological contexts is not surprising.

Birds

Six sites on Nayau yielded bird bones (Table 4). The 159 identifiable specimens represent nine non-passerine families (Table 7). Because of inadequate modern comparative skeletal specimens, the Passeriformes (songbirds) were identified only to the ordinal level. Only at three sites were four or more families of birds found; at each of these sites (Waiturutu West, Waiturutu East, and Ulu ni Koro) we believe that, as with rats, many of the bones represent prey remains of barn-owls rather than people. This is especially true for doves, swifts, kingfishers, and songbirds.

TABLE 7

Family level distribution of bird bones (NISP) at six excavated sites, Nayau, Lau Group, Fiji
Site abbreviations are given in Table 1

TAXON	**WaiT W**	**WaiT E**	**KV 2**	**UluNK**	**KoroNG**	**DKT**	**Total**
Phaethontidae - tropic birds	-	-	1	-	-	-	1
Laridae - terns	-	1	-	-	-	-	1
Phasianidae - chicken	1	-	-	-	-	2	3
Rallidae - rails	2	-	-	2	-	1	5
Columbidae - pigeons,doves	32	5	-	6	-	-	43
Cuculidae - cuckoos	1	-	-	1	-	-	2
Tytonidae - barn-owls	-	-	-	2	-	-	2
Apodidae - swifts	8	-	-	-	-	-	8
Alcedinidae - kingfishers	16	3	-	4	-	-	23
Passeriformes - songbirds	52	5	-	15	-	-	72
Bird sp. - bird	26	1	-	-	1	-	28
TOTAL	**138**	**15**	**1**	**30**	**1**	**3**	**188**
Total excl. Bird sp.	**112**	**14**	**1**	**30**	**0**	**3**	**160**

TABLE 8

Species level distribution of bird bones (NISP), five excavated sites, Nayau, Lau Group, Fiji
Totals do not include *Gallus gallus* or the migratory *Pluvialis fulva*

TAXON	**WaiT W**	**WaiT E**	**KV 2**	**UluNK**	**DKT**	**Total**
SEABIRDS						
Phaethon lepturus White-tailed Tropicbird	-	-	1	-	-	1
Anous minutus Black Noddy	-	1	-	-	-	1
LANDBIRDS						
Gallus gallus Chicken	1	-	-	-	2	3
Gallirallus philippensis Banded Rail	1	-	-	-	1	2
Porzana tabuensis Sooty Crake	-	-	-	2	-	2
Pluvialis fulva Pacific Golden Plover	-	1	-	-	-	1
Columba vitiensis White-throated Pigeon	-	-	-	3	-	3
Gallicolumba stairi West Polyn. Ground Dove	3	-	-	-	-	3
Ptilinopus perousii Many-colored Fruit Dove	30	4	-	2	-	36
Ptilinopus porphyraceus Purple-capped Fruit Dove	-	1	-	2	-	3
Tyto alba Barn Owl	-	-	-	2	-	2
Collocalia spodiopygia White-rumped Swiftlet	8	-	-	-	-	8
Halcyon chloris Collared Kingfisher	16	3	-	4	-	23
Passeriformes songbirds	53	5	-	15	-	73
Total resident birds						
NISP	**111**	**14**	**1**	**28**	**1**	**155**
Species	**5+**	**4+**	**1**	**5+**	**1**	**16+**
Total non-passerine landbirds						
NISP	**58**	**8**	**-**	**13**	**1**	**80**
Species	**5**	**3**	**0**	**5**	**1**	**14**

At the species level (Table 8), we recorded two seabirds, nine resident non-passerine landbirds, a migratory shorebird, and chicken. Each except the chicken is indigenous to Nayau. The relatively low avian diversity is typical of late prehistoric sites in the Fiji-Tonga-Samoa region, where most extinction of native birds took place in Lapita times (Steadman *et al*. 2002). The only extirpated species are the small rail *Porzana tabuensis* and the ground-dove *Gallicolumba stairi*, both of which are known to have survived Lapita occupation on many islands in Tonga (Steadman unpub. data).

Mammals

Identified mammal bones (Table 4) represent indigenous fruit bats (*Pteropus* spp.) and sheath-tailed bat (*Emballonura semicaudata*), as well as the prehistorically introduced dog (*Canis familiaris*) and rats (*Rattus* spp.). From a disturbed context (Korovatu Rockshelter 2), we found skeletal remains of the European-introduced cat (*Felis catus*). The designation 'medium mammal' refers to highly fragmentary mammal remains that could not be reliably assigned to pig or dog but fall into that size category.

Rats make up 37% of the total NISP. Although present in 9 of the 12 sites, 99% of *Rattus* bones were from Waiturutu West (76%), Ulu ni Koro (19%), and Waiturutu East (4%). This is due to the presence of barn-owl (*Tyto alba*) roosts in these three large rockshelters. Our interpretation is supported by the fact that much of the rat material is relatively

complete and was recovered in the upper levels of the excavations. Most of the rat bones are from the small prehistorically introduced *R. exulans*. At the three sites where rat bones are most common, a small portion (<10%) of the bones are from a species larger than *R. exulans*. Because these bones occur throughout the stratigraphic profile at Waiturutu West, we believe that they belong to the prehistorically introduced *R. praetor* rather than the historically introduced *R. rattus*. This finding extends the known range of *R. praetor*, previously known to exist in Lau on Lakeba and Mago (White *et al*. 2000).

Midden deposits yielded fragmentary human remains (NISP = 98) at 9 of the 12 excavated sites. Many of these bones have signs of burning and fracturing potentially indicative of non-funerary behaviour (see Steadman *et al*. 2000). This is consistent with what Best (1984: 638, 2002: 26) encountered at numerous middle-to-late period sites on Lakeba, starting in Best's Period II (*ca*. 2500 BP). He interpreted the steady occurrence of human remains to suggest that humans were a regular source of food. A single Vuda period burial (NISP = 101) was partially uncovered in a sand dune deposit at Nukutubu Rockshelter 2, comprising all of the non-midden human bone we found on Nayau.

INVERTEBRATE FAUNA

We recovered a wide variety of marine shell from excavations on Nayau (Table 9). While our analysis is preliminary, 3,221 specimens (whole shells and fragments) weighing 11.5 kg have been identified. Most are well preserved except that nearly all specimens from earth oven features were charred, such as at Waiturutu East and Ulu ni Koro. The marine invertebrate taxa are primarily molluscs from the classes Polyplacophora, Gastropoda, and Bivalvia. A small amount of sea urchin remains (phylum Echinodermata) was also found. Terrestrial gastropods were also present in small quantities (especially from basal deposits), but have not yet been identified.

The marine shell is dominated by six gastropod and three bivalve taxa. The most frequently identified gastropods in order of abundance include: *Turbo setosus*, *Turbo* spp., *Strombus gibberulus*, *Strombus* spp., *Cypraea* spp., *Conus* spp., and *Nerita* spp. Among gastropod families, the Turbinidae accounts for 42% of the total shell NISP and 63% of the total shell mass, whereas the Strombidae comprises 19% NISP and 13% total mass. The most common bivalve species are *Modiolus auriculatus* (family Mytilidae), *Atactodea striata* (Mesodesmatidae), and *Tellina* spp. (Tellinidae), none of which is as common as the most frequently found gastropods (Table 10).

Most of the identified invertebrates inhabit areas that include the splash zone above the high tide line, tide pools, sand flats, grass flats, and fringing reefs. The bivalves also can be found in shallow-water habitats such as silty or sandy inshore areas on fringing reefs (Kay 1979; Colin and Arneson 1995; Gosliner *et al*. 1996). Some of these species are easily found along Nayau's shoreline today, with *Turbo* spp. and *Nerita* spp. especially common.

TABLE 9

Summary of identified marine shell from excavations of 12 sites on Nayau, Lau Group, Fiji

Taxon	**NISP**	**Mass (g)**
Chitonidae	18	9.3
Cryptoplax sp.	8	1.4
Patellidae	1	0.5
Trochus spp.	19	121.3
Turbo setosus	156	1664.9
Turbo spp.	952	4664.3
Astralium rhodostoma	2	26.9
Astralium spp.	3	41.7
Cerithiidae	4	5.7
Nerita spp.	90	226.9
Littorina spp.	9	7.9
Naticidae	1	0.8
Lambis sp.	2	46.6
Vasum ceramicum	3	52.8
Strombus gibberulus	96	269.8
Strombus spp.	393	976.5
Cypraea annulus	14	24.3
Cypraea moneta	1	3.3
Cypraea spp.	155	240.3
Cymatium sp.	5	19.7
Drupa morum	4	34.4
Drupa sp.	2	17.1
Thaididae	2	5.1
Thais armigera	4	109.2
Nassariidae	1	0.3
Mitra sp.	1	2.5
Conus spp.	101	852.3
Terebra sp.	1	23.0
Anadara sp.	2	38.7
Modiolus auriculatus	347	208.3
Pinctada sp.	2	2.1
Spondylus sp.	2	98.1
Fragum fragum	1	1.4
Tellina spp.	32	36.5
Atactodea striata	150	199.5
Asaphis sp.	1	9.0
Periglypta sp.	1	13.3
Codakia sp.	3	19.0
Tridacna sp.	1	5.1
Echinoidea	35	6.0
TOTAL	**2625**	**10085.8**

TABLE 10
Family level summary of marine shell from 12 sites on Nayau, Lau Group, Fiji.

TAXON	Common name	NISP	% NISP	MASS (g)	% Mass
Chitonidae	Chitons	26	1	10.7	<1
Patellidae	Limpets	1	4	0.5	<1
Trochidae	Top Shells	19	1	121.3	1
Turbinidae	Turban Shells	1113	42	6397.8	63
Cerithiidae	Cerithids	4	4	5.7	<1
Neritidae	Nerites	90	3	226.9	2
Littorinidae	Littorines/Periwinkles	9	<1	7.9	<1
Strombidae	Vase and Harp Shells	495	19	1346.5	13
Cypraeidae	Cowries	170	6	267.9	3
Cymatiidae	Triton Shells	5	<1	19.7	<1
Thaididae	Thaidids	12	<1	165.8	2
Nassariidae	Nassarids	1	<1	0.3	<1
Mitridae	Miter Shell	1	<1	2.5	<1
Conidae	Cone Shells	101	4	852.3	8
Terebridae	Auger Shells	1	<1	23	<1
Arcidae	Arc Shells	2	<1	38.7	<1
Mytilidae	Mussels	347	13	208.3	2
Pteriidae	Pearl Oyster	2	<1	2.1	<1
Spondylidae	Spiny Oysters	2	<1	98.1	1
Cardiidae	Heart Shells and Cockles	1	<1	1.4	<1
Lucinidae	Lucinas	3	<1	19.0	<1
Tellinidae	Tellens	32	1	36.5	<1
Mesodesmatidae	Sandy Beach Clam	150	6	199.5	2
Psammobiidae	Sunset Clams	1	<1	9.0	<1
Veneridae	Venus Clams	1	<1	13.3	<1
Tridacnidae	Giant Clams	1	<1	5.1	<1
Echinoidae	Sea Urchins	35	1	6.0	<1
TOTAL		**2625**	**100%**	**10085.8**	**100%**

DISCUSSION

Despite the preliminary nature of our investigations, the Nayau data are informative in a number of respects. First, our data help to characterise the middle through late period prehistoric occupation of Nayau and Lau. Much of what we found for the late prehistoric period closely parallels the archaeological findings on Lakeba (Best 1984, 2002). Since relatively little research beyond Lakeba has been conducted in Lau, our findings are useful because they indicate that the middle-to-late prehistoric trends uncovered for Lakeba, including settlement phases, the presence and general chronology of pottery types and other artefacts, and the character of subsistence remains, may be widespread in the region. Settlement types including fortifications and inland rockshelters suggest that at least some of the population lived in Nayau's interior. In this position both garden areas, in the centre of the island on the rich degraded volcanic sediments, and the marine environment, evidenced by the copious archaeological shell and fishbone remains, were exploited. Items of material culture, especially lithics and pottery, are indicative of non-local influences.

Second, the scenario described above correlates with the oral traditions, which record two prehistoric invasions (Reid 1990; Young 1993). The first was from Melanesia, through Kabara and Cakaudrove (southern Vanua Levu, Taveuni, and northern Lau), and into central and southern Lau. This probably corresponds with the introduction and/or assimilation of new pottery styles, Navatu and/or Vuda. The second, later invasion was said to be from the east and north (Tonga). This well documented invasion had great social influence in Lau and Tonga and continued throughout the 1800s (Hocart 1929; Reid 1990; Thompson 1940).

Third, the zooarchaeological remains suggest that much of Nayau's indigenous fauna has been lost through human exploitation by mid to late prehistoric times. Native birds and reptiles are uncommon finds in our faunal assemblages from Nayau. Not surprisingly, subsistence patterns emphasised a broad range of inshore marine resources including small reef fishes and shellfish. We note as well that there is very little variation between the dominant marine inshore fauna identified archaeologically and the present day pattern of exploitation.

CONCLUSIONS

Prehistoric archaeological sites are common on Nayau and throughout the Lau Group. During six weeks of archaeological field work on Nayau, we located 34 sites and conducted test-excavations at 12 of them. Our future fieldwork on the island will focus on establishing a more comprehensive, island-wide site survey to determine overall settlement patterns; conducting major excavations at archaeological sites representing each of the three millennia that people occupied the island; and compiling a comprehensive collection of rock samples to determine the lithic raw materials available on Nayau. Already we have located at least one site that is >2000 cal BP and many sites that are <1000 cal BP. Finding and excavating a major site dating from 2000 to 1000 cal BP will be a challenge, but we have not explored many parts of this rugged island. If we can achieve each of our three field priorities, then we should have large, chrono-stratigraphically controlled samples of artefacts, bone, and shell to analyse in detail as the basis for tracing inter-island and intra-island cultural development on Nayau. Such analyses will place Nayau in a much more refined regional (Vanuatu through Tonga and Samoa) and local (Lau Group) prehistoric context.

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