

PREHISTORIC SETTLEMENT SYSTEM IN EASTERN TUTUILA, AMERICAN SAMOA

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In the 1960s, Roger Green, Janet Davidson and colleagues carried out extensive archaeological research in Western Samoa (Green and Davidson 1969a, 1974). That work still stands as one of the most important and best-reported projects in Pacific archaeology. Additional research in Western Samoa was undertaken in the 1970s by a team under the direction of Jesse Jennings (Jennings *et al.* 1976; Jennings and Holmer 1980). Since then, few additional studies have been reported for the island nation (Jennings *et al.* 1982; Leach and Green 1989). In the eastern islands, which constitute American Samoa (a U.S. Territory), early archaeological works were primarily surveys (Buck 1930; Kikuchi 1963, 1964; Ladd and Morris 1970; Kikuchi *et al.* 1975; Silva and Palama 1975; McCoy 1977; Clark 1980, 1981) with some limited test excavations (Emory and Sinoto 1965; Frost 1976, 1978). None of the investigations in American Samoa provided systematic regional coverage and a broad range of archaeological data. Consequently, summaries of Samoan prehistory have drawn almost exclusively from the Western Samoa data (Bellwood 1979; Davidson 1979). In 1985, however, a series of productive investigations began in American Samoa, many sponsored by the Territorial Historic Preservation Office (Leach and Witter n.d., 1987, 1990; Ayres and Eisler 1987; Gould *et al.* 1985; Brophy 1986; Kennedy 1985, 1989; Athens 1987; Hunt and Kirch 1987; Best *et al.* 1989; Kirch *et al.* 1990; Clark and Herdrich 1988; and Clark 1989, 1990, 1992). As a result of these works, substantially more is now known of the prehistory of the eastern islands of the archipelago.

Among the recent archaeological studies in American Samoa were our own investigations, primarily in the Eastern District of Tutuila Island (Clark 1989, 1992; Clark and Herdrich 1988). The overriding interest of the Eastern Tutuila research has been with the regional settlement system. Thus, the investigations were broadly directed at improving our understanding of how prehistoric populations were distributed over the landscape, how that pattern of distribution changed over time, and the systemic relationships between different human populations, and between those populations and their environmental surroundings. The two principal projects were centred on the

counties of East Vaifanua and Sā'ole, but extended slightly into Sua County. Given the sparse earlier data from the region, most of the research was given to survey, with limited soil coring and test excavations (which will be discussed elsewhere). The intent was to conduct a systematic survey of the eastern end of the island and thereby provide a relatively complete picture of settlement distribution and land use throughout two sociopolitical units. Additional data from smaller investigations elsewhere in the Territory supplement those from the eastern counties. We also draw from preliminary findings of an interdisciplinary research effort directed by the senior author and focused on 'Aoa and Leone valleys.

The full range of settlement system data collected over the last few years would carry beyond the scope of a single paper. Moreover, critical paleo-environmental and geochemical studies are still under way. This paper, therefore, emphasises settlement pattern — which is to say the types and physiographic distribution of sites — with more limited discussion of environmental changes and population interactions. These data, taken in conjunction with more limited data from other counties, provide an important information base for predicting site locations throughout the territory. Such predictive capacity is crucial for planning and preservation efforts in the Territory. Furthermore, these settlement system data can be compared with information from Western Samoa to determine whether Samoan society in prehistoric Tutuila was a reflection of patterns found in Western Samoa, or whether there were significant differences between the western and eastern islands. In brief, while most elements of the settlement systems are consistent between the two island groups, important differences exist. The product of these studies represents a better understanding of the complexity that existed in prehistoric Samoa.

ENVIRONMENTAL SETTING

Tutuila, the largest island of American Samoa, is divided into 11 counties grouped into two districts, Eastern and Western (Fig. 1). The island is long (31.9 km east-west) and narrow (from 9.8 to 1.6 km), with an area of about 142 km² (Atlas 1981). Extending through the central axis of Tutuila is a rugged ridge-line with scattered peaks, and numerous secondary and tertiary ridges radiate from this central axis. The highest peak on the island is Matafao, at 653 m above sea-level (a.s.l.), and most of the central ridge ranges between 250 and 370 m a.s.l. Scattered along the ridge tops are "prominent points," locations on ascending ridge tops where there is an abrupt shift to a more gradual upward slope for a stretch of many metres, then a shift back to a more pronounced slope. Because of the high rainfall (annual average of

about 317 cm) and steep slopes (only 34 per cent of the island at less than 30 per cent slope; Atlas 1981), slump and landslides, especially after deforestation, are common occurrences.

Around the coast are numerous small valleys and coastal plains. The north coast of the island is more rugged, the valleys smaller, and the bays smaller and fewer than along the south coast. The largest expanse of comparatively flat ground is Tāfuna Plain in the south-west portion of the island. The most remote point from any coastline is only 3.36 km from the shore, and the island has 125.2 linear kilometres of coastline (Atlas 1981). Fringing reef is found around most of the coastline. Streams are small and often intermittent, and all but the smallest of the valleys are drained by at least one stream.

Tutuila is formed by five major volcanic groups: Olomoana and Alofau (or extracaldera Pago) Volcanics in the east, Pago (or intracaldera Pago) Volcanics in the centre, and Taputapu and Leone Volcanics in the west (Stearns 1944; McDougall 1985). The emerged basalts of Tutuila generally date to the early Pleistocene (McDougall 1985), while the Leone Volcanics may not have developed until the Holocene (Stearns (1944:1313). No eruptions have been reported for Tutuila during historic times.

On the eastern end of the island, each valley has a coastal band of calcareous soil formed in sandy marine deposits, with 0 to 15 per cent slope, and elevation ranges from sea-level to 5.0 m a.s.l. (USDA 1984:50). It is on these lands that most houses are situated today. The floors of the larger valleys are of silty clay or stony silty clay with 0-3 per cent slopes. These soils are very deep, poorly drained, and formed in fine textured alluvium (USDA 1984:13). Bounding most of the valleys, at least partially, are bands and pockets of very stony clay loam that formed in colluvium and alluvium, and range from 15-60 per cent slopes (USDA 1984:10). On the ridges with 70-130 per cent slopes the soils are variable but are generally clay-rich, stony, and shallow in some places, deep in others (USDA 1984:11-12, Soils plate 3).

SETTLEMENT UNITS

Clusters of associated features normally were regarded as single settlement units and assigned one site number. Discrete and comparatively isolated structures were given individual site numbers and, to single out members of different site categories, specialised sites (i.e., *tia 'ave*, quarries, and paths) were also assigned individual site numbers, even if close to other features. In some cases, however, ditches and other features in proximity to a *tia 'ave* (or star mound) were grouped with that structure.

Samoa settlement units and patterns, both ideal and real, have been discussed by several authors drawing from ethnohistorical, modern ethno-

graphic, and/or archaeological data (e.g., Davidson 1969a, 1974c; Holmer 1976b, 1980; Frost 1978; Shore 1982). The basic residential unit is the *fale*, or house, the remains of which are represented by foundations with kerbstones, or surface scatters of coral rubble and waterworn pebbles from old floors, or both. Two larger settlement units are the *nu'u* and the *pitonu'u*, which can be loosely translated as “village” and “subvillage”, respectively. A *nu'u* is best identified as a political grouping of titles that actively affiliate with one another and are recognised as a unit by way of a *fa'alupega*, or honorific speech recited at all formal gatherings and naming the constituent titles, descent groups, and *nu'u* segments.

Shore (1982:51) cautions against taking *nu'u* and *pitonu'u* as absolute rather than relational units: “any encompassed unit of settlement may be called *pitonu'u* if it includes more than one household group, is conceived to have a distinct identity, and is embedded within an even larger territorial organization”. Furthermore, action rather than location lies at the heart of *pitonu'u* membership in a *nu'u*. That is, the members of a *pitonu'u* must participate with, or act as a part of, a *nu'u* in order to be identified as such (Shore 1982:52). Thus, what may appear to be a single village may, in fact, consist of more than one *nu'u*. At the same time, isolated groups of households may not constitute independent *nu'u*, since households or even entire *pitonu'u* may be physically separated from the rest of the *nu'u* but still participate in *nu'u* affairs. This notion of participation for identity is also central to claiming membership in an *'āiga* (a cognatic descent group) and is an important principle for Samoan social relations (Hjarno 1979-80; Meleisea 1987).

For archaeological settlements, Davidson (1969a) has identified three types of features as indicators of a *nu'u*: the *malae* or open political/ceremonial space, *fale tele* or community/guest houses of each important *āiga*, and the *fale aitu* or god/spirit house. Features representing each of these types, however, are as likely to be found at a *pitonu'u* as at *nu'u*. For that reason, together with the importance of group participation and recognition, the distinction between *nu'u* and *pitonu'u* cannot be made archaeologically with certainty. In a few cases Davidson attempted to differentiate *nu'u* from *pitonu'u* on the basis of settlement size relative to modern units: the site at Vaigafa was judged “large enough to be considered a complete village” (*nu'u*) but the sites of Saso'a and Sauniatu were considered so small as to be only *pitonu'u* (Davidson 1969a:58).

In this study we shall group *nu'u* and *pitonu'u* simply as residential settlements. But this is only due to the lack of archaeological correlates differentiating the two settlement units and should not be taken as suggesting

that the *nu'u/pitonu'u* distinction was not important prehistorically. We assume that it was a meaningful distinction in late prehistory, but how far back in time it can be carried is anybody's guess. The presence of permanent dwellings together with *malae*, *fale tele* and/or *fale aitu* will be used as identifying criteria of either unit. Settlements can thereby be distinguished from groups of houses related to specialised inland activities such as refuge and defence, resource exploitation, short-term agricultural activities, and *malaga* (travelling groups).

The settlement identifiers noted may be difficult to discern archaeologically. Although the ideal Samoan village plan included a *malae*, such a feature is not always easily identifiable at an archaeological site. At the extensive settlement of Mt Olo in the Mulifanua area of west 'Upolu, Western Samoa, Holmer (1980) found that *malae* conforming to ethnohistorical and ethnographic descriptions are not present, but smaller clearings were identified that may represent *malae*. *Fale tele* and *fale aitu* are commonly located on the edge of the *malae*, and their presence may aid in *malae* identification.

Davidson (1969a:64) observed that several ethnohistorical observations indicate that *fale tele* are likely to be larger in area than other foundations, and that two hearths were observed for some *fale tele*. For Mt Olo, Holmer (1980) concurred that platform areas of *fale tele* are larger than all other structures, but foundations of chiefs' houses have larger volume due to greater heights. He estimates *fale tele* at 90-180 m² in area and 200 m³ in volume, chiefs' houses at 30-60 m² and 250-400 m³, and normal dwellings at 14-60 m² and 100-200 m³ (Holmer 1980:93). On the basis of both ethnohistorical and recent information, however, it must be stressed that chiefs' house foundations may or may not be of greater height than other structures, and that the actual houses are in the range of other dwellings in the settlement (Davidson 1969a). If chiefs' houses cannot be differentiated from other dwellings, the number of contemporary *fale tele*, if identifiable, may be taken as an indicator of the number of important titles at the settlement.

Each Samoan village had its god and a structure of some sort consecrated to that deity (e.g., Turner 1986:146). *Fale aitu* varied considerably in size, form, and location, and the full range of variation in these features is simply not known. In some cases a *fale tele* also served as the *fale aitu*, and in other instances the *fale aitu* may have been outside the village grounds (sources cited by Davidson 1969a:67). Davidson suggests that star mounds (here termed *tia 'ave*) may have served, at least in part, in the same capacity as *fale aitu*. Some *fale aitu* were as large as *fale tele*, others were indistinguishable from residential dwellings, and still others were miniature houses. Some had surrounding wooden fences, and sometimes there was a sacred grove in

addition to, or possibly in place of, the *fale aitu*. Consequently, *fale aitu* rarely will be identifiable in archaeological remains.

Along with the residential settlement features, a number of specialised sites were identified. Previous investigations in Samoa identified a class of structure referred to as “star mound” (e.g., Green and Davidson 1969a, 1974; Kikuchi 1963; Frost 1978) or “cog mound” (Jennings *et al.* 1976; Jennings and Holmer 1980). Building upon Davidson’s (1974b) work, Herdrich (1991) has applied the term *tia ‘ave* to any rock or earthen mound (*tia*) with one to eleven (usually five or more) ray-like projections (*‘ave*). This term thereby encompasses the star/cog mounds as well other types of mounds discussed by Davidson. More conventional site types include defensive sites (from isolated ditches to fortification complexes), resource exploitation sites (quarries), terraces, paths, and some other sparsely represented types.

SURVEY RESULTS

Although several coastal lowland areas were investigated, a substantial effort was given to survey of inland — or, more properly, upland — areas. Because of the nature of the terrain, this emphasis meant survey coverage focused on the ridge tops. In fact, only the smallest ridge spurs were not examined throughout East Vaifanua and Sā’ole counties. Ridge slopes, however, were usually quite steep and heavily vegetated, making travel difficult and ground visibility very poor. As a result, only small areas of slope, notably the lower reaches around some of the valleys, were examined. The primary study area of Eastern Tutuila and the locations of key sites discussed in the text are shown in Figure 2.

The survey results are summarised below by site type. In general, sites in the coastal lowlands were few and were large residential complexes; no *tia ‘ave*, quarries, forts, or other functionally distinct site types were found there. In the uplands, sites are more numerous and varied, but they represent smaller residential populations and more specialised activities. The primary site types found in the uplands are listed by county and ridge in Table 1, which categorises sites on the basis of structural and functional attributes. Where evidence of different functions is present, a site is classified according to the dominant activity represented. Additionally, even though many sites show evidence of both prehistoric and historic activities, they are indicated as historic only if there is little or no evidence of prehistoric age.

Residential Sites

In Eastern Tutuila, three categories of residential site are identified based primarily on the number of house remains. “Large” residential sites are clusters of 10 or more houses that also appear to include at least two of the

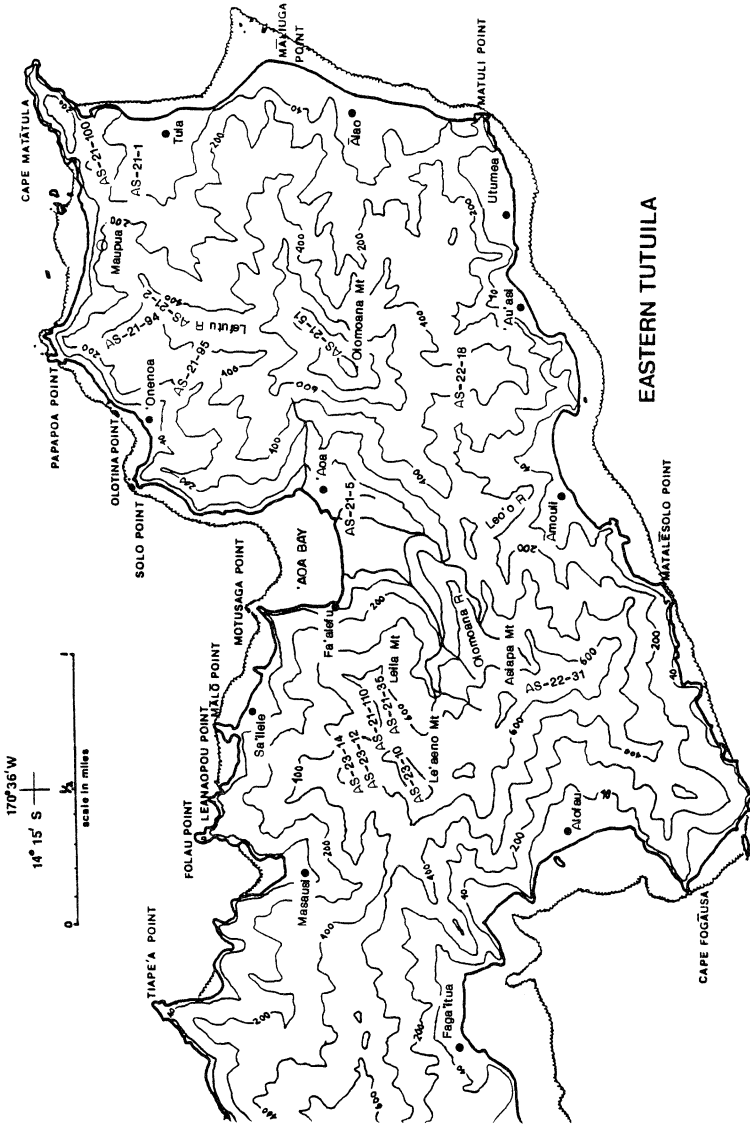


Figure 2. Map of the eastern end of Tutuila showing general topography and key sites in the study area.

settlement identifiers. “Small” residential sites are represented by 2-9 household units which lack settlement identifiers. The final residential category consists of single household units.

In the coastal lowlands, given the long-term and current coastal occupation at nearly every valley and plain, prehistoric structural remains are unlikely to be visible on the surface in most areas, although each of those areas probably contains buried cultural deposits. Consequently, “large” prehistoric settlements are assumed to have existed in the coastal lowlands at all valleys and coastal flats even though actual remains may not be observable. Nevertheless, site numbers were assigned to only those coastal areas where prehistoric remains of some sort were found. Intensive surveying was limited to the coastal planes of ‘Onenoa and Maupua, the very small valleys at Fagatele Cove and Fagaititi Cove, the small valley at Ālega, and the comparatively large valley at ‘Aoa. Elsewhere, coastal lowland areas were subject only to limited reconnaissance checks, which consisted of examinations of stream mouths for artefacts washed out from buried deposits, and inspection of the stream banks (where visible) for cultural layers. The following summary of the results of those investigations proceeds in a clockwise pattern within each county.

Very little investigation took place in Sua County. On the north coast there are historic (probably U.S. military) features at Fagatele Cove but no definite prehistoric materials were found there or at nearby Fagaititi Cove. Both of those coastal plains are too small to support more than a few households. Basalt tools were discovered at Masausi and Sa‘ilele in the north, and at Faga‘itua on the south coast. The extent of occupation at these sites is not known but it is only reasonable to expect sizeable prehistoric settlements at each location. At Sa‘ilele, an old temple is reported to have stood in the village *malae* until after the turn of the century (Kikuchi 1963:124). Faga‘itua almost certainly had extensive early occupation because of its size, the large bay with a developed reef, and the sociopolitical significance of the settlement. The chiefly title Lei‘ato of Sua and East Vaifanua began, according to legend, in Sa‘ilele, but the son of the first Lei‘ato moved to Faga‘itua and his line eventually became senior high chiefs of the Eastern District (Gray 1960:24, 96).

At the small valley of Ālega on the south coast, 14 sites have been found, including surface scatters of artefacts near the coast, residential and industrial (lithic) terraces in the upper valley and ridge slopes, and basalt quarries, again on the ridge slopes (Clark 1992). Excavations at one terrace (site AS-23-21) at the rear of the valley yielded radiocarbon dates from the base of the terrace layer of 1040 ± 230 B.P. and 590 ± 70 B.P. Given the small size of the valley,

the beginning of terrace development in the 14th century A.D. was probably not much later than initial occupation at Ālega. The three quarries (sites AS-23-22, AS-23-24, AS-23-29) and related features, as well as the abundance of basalt debitage and preforms, suggest that Ālega, with its small population, was an “industrial” valley supplying basalt preforms and/or tools to other areas.

In Sā’ole County, an old well was reported for Utumea (Kikuchi 1963; Clark 1980) and surface survey at ‘Au’asi by McCoy (1977) failed to reveal any sites. Our check of the streams at Āmouli did not reveal any evidence of prehistoric occupation. Alofau was not checked but, based on the environmental conditions, both it and Āmouli are undoubtedly locations of large prehistoric settlements.

In East Vaifanua County, the investigations at ‘Aoa were the most extensive and intensive carried out in Eastern Tutuila. The valley is a small amphitheatre landform (less than half a kilometre deep) bounded by pronounced ridges. Six streams cross the valley and three of these meet at a small estuary. At the rear-centre of the valley, next to the ridge talus, is a marsh. The eastern lobe (from the estuary eastwards) stands at a slightly higher elevation than most of the valley floor. The entire valley was intensively surveyed and a variety of features and surface artefacts were found. Two site numbers were assigned to these remains, one for ‘Aoa *nu’u* and the valley (AS-21-5), and another (AS-21-6) for the smaller Fa’alefu *nu’u* and western coastal strip. Several house foundations and other features situated on the narrow coastal shelf at the far east end of the bay were assigned separate site numbers.

Within site AS-21-5, 16 localities were differentiated on the basis of some geographic marker (e.g., a stream) or a degree of spatial separation of surface remains. In the eastern lobe, many basalt tools and pottery sherds have been found along the shoreline and around the existing houses, and there are several abandoned household-related features (probably historic in age) at the rear of the valley. West of the estuary and over the lower half of the valley, shell, coral, and pebbles from old house floors are scattered over the surface in a nearly continuous manner, although the density of materials varies. Consequently, individual floors were difficult to identify beyond a few heavy concentrations of materials. Basalt tools and flakes are scattered over the surface but no pottery has been found. The surface materials begin to diminish in the middle valley and largely disappear in the upper valley, although there are some isolated upper valley house remains and agricultural features, all probably historic. In Fa’alefu, site AS-21-6 was defined on the basis of surface artefacts at three localities.

Excavations have been conducted at AS-21-5, Locality 2, but the results of

that work are still under analysis and will not be discussed here. Instead, we shall make just a few observations. The excavations at 'Aoa produced pottery sherds, obsidian, basalt adzes, preforms, flake tools, and waste flakes, and revealed two major occupation components capped by a largely sterile overburden. The lower component is pottery- and obsidian-rich, basalt-poor, and dates to as early as 3000 years ago. The upper component is pottery-poor, obsidian-poor, basalt-rich, and dates to about the 15th century A.D. This is the only ceramic residential site known for Tutuila. Additionally, four coring transects through the valley revealed significant geomorphological change. Within the last few thousand years an embayment was transformed into a backbarrier estuary and/or swamp, and eventually into the valley that exists today. The eastern lobe of the valley was not part of the embayment, however, and the ancient settlement was located along the old shoreline and/or swamp edge.

Evidence of prehistoric occupation was also found at the coastal plains of 'Onenoa and Maupua. At the rear of 'Onenoa are a few abandoned house foundations and residential terraces (AS-21-7). Two boulders with grinding facets (for adze production) were found in Vaisa Stream in the vicinity of the residential features, and several basalt artefacts were collected from that area as well as from a second locality on the eastern edge of the village. At Maupua numerous basalt artefacts scattered among the coral and pebble surface associated with a modern household represent limited (spatial constraints) prehistoric occupation (AS-21-69).

On the east coast, at the rear of Tula valley and about 500 m inland of the coast, is the old site of Tulauta (AS-21-1). In the mid-1970s, limited test excavations were conducted there by Frost (1976, 1978) (who called it Tulotu), who dug five trenches covering 11 m². A few years later the site was visited by Clark (1980), and more recently Gould *et al.* (1985) partially excavated a two-square-metre unit there. The list of features at the site includes 10-13 house foundations, two pigsty enclosures, several graves, rock alignments, pits, fireplaces, and walls. One of the foundations is higher than the others and may have been the base for a chief's house. An unusual feature is an upright basalt slab (supported on the west by rocks) that is smooth except for some parallel lines on the east side (Gould *et al.* 1985:4). This may represent a *fale aitu* or related feature, and a *malae* may be present in a featureless area separating north and south clusters of structures. Gould *et al.* (1985:1) observed that differences in the condition of features suggest that some are more recent than others, and that the older features are found in the south cluster while the apparently more recent features are located in both clusters. If so, the suggested *malae* may relate to the last phase of occupation

only. All investigators at Tulauta noted an abundance of basalt artefacts, with over 200 adzes and over 100 flake tools collected from the site (Brophy 1986:49). However, the claim that Tulauta was a quarry site (Gould *et al.* 1985:6) is unwarranted.

Frost (1978:206) reported radiocarbon dates of 2560 ± 140 B.P. and 630 ± 70 B.P., but the earlier date is probably unreliable and should be rejected (Clark and Herdrich 1988:26-31). Such a date would indicate occupation during the ceramic period in Samoa, but neither pottery nor the commonly associated obsidian was recovered from the site. Gould (personal communication) and colleagues, on the other hand, obtained dates of 190 ± 80 B.P. and 420 ± 80 B.P., which are more in line with the latter end of the range of Frost's more recent date. We suspect that the surface remains at Tulauta are late prehistoric-early historic, that the subsurface deposit examined dates to the 14th-15th century A.D. or later, and that further subsurface investigations in the valley is likely to yield much earlier deposits.

There was no direct evidence of prehistoric residence found at Ālao, but the broad, sandy, prograding beach would obscure indications at the shoreline. Coring at Ālao clearly indicates substantial landscape change, with a transformation of a mangrove swamp in a southern secondary valley to the modern valley floor in the last 3000 years. Bits of charcoal in the alluvial sediments overlying mangrove peat suggest that human action played a role in the geomorphological changes at Ālao. Thus, we suspect that early occupation remains are inland of the present village, probably buried under colluvial-alluvial deposit.

Within the uplands there is only one large settlement on the ridge tops in the primary study area, on Lefutu ridge in East Vaifanua. Since all but the very small ridge tops have been surveyed in East Vaifanua and Sā'ole counties, no other sites of this type exist in the area, although ridge-top residential sites have been found in other counties of Eastern Tutuila.

Lefutu (AS-21-2) was listed as a place-name by Pritchard (1866) and later mentioned by Krämer (1902-3), suggesting that the site was known into the historic period. The site was first reported by Kikuchi (1963:42), investigated by Frost (1976, 1978:89-101, 241-4), and revisited by the authors. Our reconnaissance survey revealed that Lefutu covers an area over 65 m wide and 350 m long. A sporadically visible sunken path extends along the eastern ridge top to and through the site. On prominent points of the ridge top leading to the settlement from the north coast are four *tia 'ave*. At the third *tia 'ave* is a ditch along the down-slope edge of the structure. A causeway crosses the ditch as part of a ridge-top path. The ditch gives a more pronounced character to the *tia 'ave* and may also have served a defensive function, although it is

not nearly as deep and wide as typical defensive ditches.

The Lefutu site is situated where the ridge top broadens and flattens to a very slight incline. Several basalt tools, numerous flakes, and four portable grinding stones were scattered over the site. The surface features at the site include 12 house foundations, two terraces with indications of house floors, two terraces lacking surface traces of residential activity, four probable graves (one of these on a house foundation), eight pits (probably food storage), and a linear depression. The house foundations consist of low, roughly circular-to-oval platforms made with large basalt (sometimes coral) kerbstones, and they are sometimes partially paved with basalt and coral slabs. Inner floor areas on the foundations often are marked by waterworn pebbles and coral rubble. Most of the foundations are large, many falling into the size range suggested by Holmer for *fale tele*, although the internal house floors are much smaller. One notably large foundation measures 20 m by 13 m and 0.3 m high, with an inner floor area 9 m by 7 m. The inner floor has a stone-sided fireplace, and the outer foundation has four additional fireplaces. Based on the foundation area and the presence of multiple fireplaces, this feature probably represents a *fale tele*. It lies at the far north end of the settlement while another exceptionally large foundation (nearly 300 m²) lies at the far south end of the complex and it, too, may be a *fale tele* foundation. On the east side of the ridge top, in an area where it is quite broad, surface remains are absent. This area is small but seems likely to have served as a *malae*.

Frost excavated three units (a total of 6 m²) at Lefutu and identified only one thin cultural layer (12-15 cm thick) that varied in colour with depth (Frost 1978:95). A single radiocarbon date was reported at 810 ±210 B.P. (Frost 1978:206). Frost concluded that (a) Lefutu was an isolated and fortified refuge site; (b) it represents a single occupation phase; and (c) it demonstrates the occurrence of warfare on Tutuila by the 12th century A.D. (1978:101, 241-4).

We do not agree with Frost's interpretation of Lefutu. Even though on a ridge top, Lefutu is a short walk from the coastal villages and is no more isolated than many of the north-coast villages. Furthermore, the site is much more extensive than Frost realised, and it is unlikely that a purely refuge site — with a single phase of occupation — would have such large, well-made house foundations, especially with extensive use of large coral chunks. Moreover, the single possible defensive ditch is atypically shallow and not very formidable, especially for a site for which the primary purpose was supposedly defence. We contend that Lefutu was a permanently occupied upland settlement. Given the nature of the terrain in Eastern Tutuila, Lefutu is one of the few ridge tops that could accommodate truly upland settlements.

If, as the historic documentation suggests, the site was occupied into the early historic period, then, according to Frost's interpretation, there would have been a single occupation phase — related to a period of warfare — that lasted some seven centuries. We suspect that the occupation at Lefutu extends from the latter portion of the calibrated age range (A.D. 780-1470 at two sigma) into the early historic period.

On two secondary ridges extending to the north-west of Lefutu Ridge are two smaller complexes of residential features and two *tia 'ave*, with occasional basalt artefacts scattered over the surface. One of these smaller complexes (AS-21-94) includes four terraces with seven associated features, three house foundations, five large pits (probably food storage or *masi* pits), an ancient path, and a probable grave. Some of the residential features were built on top of a *tia 'ave*, but they appear to be post-abandonment constructions. The second complex (AS-21-95) is smaller still, consisting of three house foundations, two terraces, one grave, an ancient path, a wall segment, and two pits.

The separation of residential remains on the three ridge tops was judged sufficient to warrant separate site numbers. The status of each of these sites is not known, although Lefutu is large enough to have constituted a *nu'u* while the two small complexes are almost certainly too small to have been independent *nu'u*. The relationship between these sites, and between each site and coastal *nu'u* (i.e., at Tula and 'Onenoa) are also not known. In any case, the permanency and variety of remains at all of these sites clearly indicate more than short-term occupation.

Seven other small residential sites were found on the ridges and slopes, five in East Vaifanua and two in Sā'ole. These consist of groups of two to five house foundations or floors and may not have been permanent occupation sites. They lacked the settlement markers discussed above and all are probably small segments of larger *nu'u* on the coast. At a few locations in the study area there are isolated upland house sites, represented either by low platforms or terraces with floor areas, but most of those are historic.

Beyond East Vaifanua and Sā'ole, only two other inland, ridge-top settlements are known for Eastern Tutuila; these are Mt 'Alava Ridge (AS-25-1), in Ma'oputasi County, and Fa'iga Ridge (AS-24-2), in West Vaifanua. At Mt 'Alava, Frost (1978), who dug 14 m² at the site, identified seven house foundations, one of which was larger and slightly higher than the others. According to Frost, Mt 'Alava Ridge was a refuge site. However, no unequivocal defensive features were reported, only two natural ravines that "appeared to have been modified by additional ditching and banking efforts" (Frost 1978:77). Kikuchi (1963:68) reported informant claims of a series of

defensive ditches on the ridge top, though not in the immediate vicinity of the residential site, which he classified as an “abandoned inland village” (1963:42). Frost (1978:206) reported dates of 380 ± 80 and 90 ± 80 B.P. from the occupation layer. These dates, together with the presence of both prehistoric and historic materials at the site, as well as Kikuchi’s (1963:43) informant information, indicate that the site was occupied in the late prehistoric and early historic periods.

Kikuchi (1963:43) reported, but did not visit, the Old Vatia site (AS-24-2), which was found by the authors on Fa’iga Ridge between Vatia Bay and Tafeu Cove, in West Vaifanua. The site consists of at least 30 surface features, including 23 house foundations. Most of the foundations are large, well-made with boulder kerbing, and almost certainly for permanent occupation. No defensive features are present at the site although the ridge slopes are very steep and access is limited to the narrow ridge top. Located at this site is a paving of flat pieces of coral over an area about five metres (north-south) by three metres, with small scatters of pebbles about two metres to the south and three metres to the north. These features are at a comparatively broad section of the ridge top roughly in the middle of the settlement, with no nearby house foundations. We suspect that the paving represents a *fale aitu* located on a small *malae*. The two closest foundations, which are of average floor area, have rectangular kerbstones that are noticeably larger than those of the other foundations. This characteristic, together with the location on the possible *malae* edge, suggest that these may represent houses of high-ranking chiefs. Two other foundations stand out as unusually large, both with floor areas within the range proposed by Holmer for *fale tele* (over 100 m²). One is located at the north-east end of the site while the other is near the south-west end, each possibly associated with one of the proposed chief’s houses. In short, there is strong evidence that the remains on Fa’iga Ridge represent a prehistoric settlement rather than a special purpose site.

Tia ‘ave

Before 1986, 10 *tia ‘ave* had been reported for Tutuila: nine from the Tāfunā Plain and one (though not initially recognised as such) at the Tataga-matau basalt quarry (Buck 1930; Frost 1978; Clark 1980; Leach and Witter n.d.). Our surveys located another 62 *tia ‘ave* in Eastern Tutuila, and in 1988 four additional examples were found at Tataga-matau by Best *et al.* (1989), bringing the total on Tutuila to 76. The characteristics of these structures have been described elsewhere (Herdrich 1992; Herdrich and Clark 1991) and will only be summarised here.

All of the Eastern Tutuila structures have an earthen fill and a series of rays,

or projections, forming the perimeter. The rays usually are faced with basalt boulders, but in some cases the number of boulders was so low as not to have been effective retainers. At seven structures the facing included (or consisted entirely of) chunks or slabs of coral; all of these *structures* are in East Vaifanua, and particularly on Vaimumu Ridge. While the heights of the structures vary from 0.2 to 3.0 m, most *tia 'ave* in the survey area are less than a metre high. Several of the mounds have shallow ditches (less than 50 cm deep) around (fully or partially) the rays. These ditches provided greater, or in some instances the only, definition of the rays, or provided the only form of up-slope closure for the structure. At three *tia 'ave* sites, deep, presumably defensive, ditches a few metres wide and more than two metres deep on their highest face cut across the ridge top.

There is a clear pattern in the placement of *tia 'ave* on peaks and prominent points of ridge tops. This pattern is so dominant that, from topography, one can predict with very high success where such sites will be found. *Tia 'ave* are not evenly distributed in the counties surveyed: 37 are in East Vaifanua, 19 in Sā'ole, and six in Sua, giving site densities of 6.25 per sq. km for East Vaifanua and 4.15 per sq. km for Sā'ole. Although East Vaifanua is larger than Sā'ole, size differential cannot account for the occurrence of nearly twice the number of *tia 'ave* in the former county. The explanation for this pattern probably lies largely in the population sizes of the two areas, with East Vaifanua supporting a larger and more evenly distributed population. Very little of Sua has been surveyed to date, but, given the presence of six *tia 'ave* in the small area examined, it seems quite probable that Sua also contains a large number of these sites.

The *tia 'ave* on the Tāfunu Plain differ considerably in construction. They are high and constructed of rubble and stacked rocks, which are plentiful on the plain. A similar construction technique was used on the gently sloping Mt Olo tract of western 'Upolu (e.g., Holmer 1976a, 1976b; Hewitt 1980). The ridge-top *tia 'ave* of 'Upolu (e.g., Davidson 1974b), however, are of similar construction to those in Eastern Tutuila. Thus, topography and availability of rock are important factors in the construction of *tia 'ave*.

Although none of the Eastern Tutuila *tia 'ave* has been dated, Davidson (1974c:243) proposed that such structures in Western Samoa were late prehistoric constructions. Holmer's (1976a) excavations of a Mt Olo *tia 'ave* produced radiocarbon dates on the charcoal near the base of the structure of 270 ± 110 B.P. and 440 ± 100 B.P., which, taken together, indicate construction some time since the beginning of the 15th century A.D. Best *et al.* (1989:28) recently reported a radiocarbon date of <250 B.P. from the base of a *tia 'ave* in Western Tutuila. Thus, it appears that *tia 'ave* are comparatively late prehistoric structures.

Defensive Sites

The survey in Eastern Tutuila revealed seven sites with defensive features: one isolated deep ditch; three (possibly four) *tia 'ave*-defensive ditch combinations; and three highland fortification sites, two of which may be part of a single complex. Two of the *tia 'ave* ditch combinations are on Leo'o Ridge, which constitutes the shortest and easiest overland route from the south coast to the north coast, a route that may well have been important to defend. Deep ditches cross the ridge top at each end of both *tia*. A third combination is on Olomoana Ridge, just west of the juncture of Olomoana and Leo'o ridges, where two deep ditches were found, both on the east side of a *tia 'ave*. Olomoana Ridge provides access to the central ridge of the island, and thereby a rear approach to nearly any valley in the district. A comparatively shallow ditch lies off the end of a *tia 'ave* near the Lefutu site, on the ridge-top approach from the coast. Forts are present on each of the two largest peaks in the survey area, Le'aeno Mountain and Olomoana Mountain, both of which lie on the border of counties that roughly equate with traditional sociopolitical units.

Le'aeno is at the juncture of three counties and supports a large complex consisting of two defensive sites, one (AS-23-10), associated with the primary peak (290 m a.s.l.) and the other (AS-21-35) associated with the secondary peak (about 260 m a.s.l.) some 155 m to the north-east. At the south-west edge of the primary peak is a deep (2.5 m on the peak side) ditch that impedes peak access. This impediment seems superfluous because the approach from the south-west is exceedingly difficult and therefore unlikely to be taken by an attacking force. It is possible, therefore, that the ditch served another purpose as well, such as a conceptual bounding of the complex, or perhaps a boundary marker for geopolitical units. A second deep ditch defines the north-east edge of the peak while the other sides are nearly sheer. Thus, the peak is effectively bounded and protected on all sides.

North-east of the second ditch, over the next 90 m or so of very gently descending ridge top, are two other defensive ditches a few metres wide and about two metres deep, and then an abrupt — probably artificially steepened — drop of some eight metres to a narrow terrace. Only two to three metres wide and with a steep face, the terrace crosses the ridge top. Several metres beyond the terrace is another deep ditch, but this one has a small causeway for limited access to the rear terrace. Spread over the ridge top from the last ditch to the saddle between the primary and secondary peaks are several very large terraces with high, steep, rear embankments.

Atop the secondary peak are two well-made *tia 'ave*, one on a south-west high point of the peak and one on a north-east high point. On the descending

ridge top that continues north-east of the secondary peak is a second defensive complex (AS-21-35). The north and south sides of the ridge top range from sheer bluff to very steep slope. Extending down the ridge top towards the saddle between Le'aeno and Leila peaks is a series of large terraces with boulder retaining walls. The upper terrace is only about three and a half metres wide but it is very long and has a massive facing of large boulders stacked three to four metres high. The height and acute angle of the rock facing would make attackers highly vulnerable to defenders on the terrace above. The terrace arcs from the north bluff around the ridge top to the south edge where the rock facing ends, although the terrace continues for many more metres above the extremely steep slope. The series of low terraces below the massive facing have large surfaces and occur in two sets, one on either side of a wall/raised walkway that runs up the ridge top. This latter structure is similar to the "raised walkways" reported for 'Upolu (Holmer 1976b), although it is rather narrow and may be simply a broad, low wall remnant. Below the terrace complex the wall/walkway ends and a sunken path begins that continues across the saddle and up to a *tia 'ave* on the south-west side of Leila Mountain.

Several other sites were found in the vicinity of the Le'aeno defensive sites: a small basalt quarry on the edge of AS-21-35 and, on Usi Ridge which extends to the north from the secondary peak, a terrace, two *tia 'ave*, and two small basalt quarry combinations (each close to one of the *tia 'ave*). All of these features are found within about 450 m of the secondary peak and may be part of the total Le'aeno complex.

Olomoana Mountain is on the boundary between East Vaifanua and Sā'ole counties, and a fortification site (AS-21-51) is centred on twin peaks (at 327 m a.s.l.) separated by a short saddle. Five terraces are located on the south-western ridge-top approach to the peaks, both peak tops are flattened as terraces, then three low terraces are on the saddle, and five additional terraces step down the north-east ridge-top approach. The last of these is just above a relatively flat but very narrow (a few metres wide) stretch of the ridge top, beyond which is a prominent point with a *tia 'ave*. The terraces are slightly variable in size but entirely cross the ridge top. The rear embankments are up to four metres high and lack stone facings. Although we would not wish to make too much of word meanings, it is interesting to note that *'olo* can mean "fort", and *moana* can mean "be devastated", as by a battle (Milner 1966:146, 163). Other meanings are possible for these terms and current spelling of Olomoana lacks the glottal, but that may not reflect ancient usage. One might suggest that the name Olomoana refers to a refuge fortification for times of military devastation, or a fortress once devastated, or some such meaning.

The largest defensive complex previously reported for American Samoa is in Western Tutuila, at Tataga-matau, where the range of features includes basalt extraction areas, flaking areas, terraces (some related to quarrying and others possibly residential), *tia 'ave*, earthen platforms, stone walls and alignments, depressions, defensive ditches, and a large ditch-and-bank feature (Buck 1930; Leach and Witter n.d., 1987; Best *et al.* 1989). This fortified complex is located very near the juncture of three modern counties of the Western District. The precise extent of the site still has not been determined, nor have the functions of all of the features, but it is clear that Tataga-matau was not just a large basalt quarry. Elsewhere in Western Tutuila, a lowland complex of stone-lined trenches over two metres deep and of unknown length was reported for the Tāfuna area by Kikuchi (1963:68), who observed that the site could be prehistoric, as informants claimed, or features dug for the defence of an airbase during the Second World War.

Resource Exploitation Sites

Basalt was probably the most important raw material for tool manufacturing in prehistoric Polynesia, although sites for the exploitation of that resource are rare in West Polynesia. Previous investigations in Western Samoa have failed to identify any basalt quarries. On Tutuila, however, Tataga-matau, in the Western District, has long been known as a major quarry. Recent reinvestigations of Tataga-matau have revealed that it is one of the largest basalt quarries in the Pacific and, as noted, site activities extended beyond basalt extraction. As a result of our research in Eastern Tutuila, nine new basalt exploitation sites have been found.

In the area of the Le'aeno fortification complex (AS-21-35), up-slope from the north end of the massive stone-faced defensive terrace, is a basalt quarry marked by a small concentration of large basalt flakes (AS-21-110). In the area of heaviest concentration, the ground surface is completely covered with debitage and a few small preforms, although the accumulation is not very thick. On Usi Ridge, which extends to the north from the secondary peak of Le'aeno, is a small basalt quarry (AS-23-12), consisting of four concentrations of flakes and preforms lying next to, and on the upland end of, a *tia 'ave*. A little over 20 m down the ridge top is a similar complex of *tia 'ave* and adjacent basalt quarry (AS-23-14). On the south-east ridge top leading to Asiapa peak is a basalt quarry (AS-22-31) made up of three dense concentrations of flakes and some preforms. A sunken path leads up the ridge top, past the quarry, around a *tia 'ave* that sits on the south-west crest of the peak, and beyond. On the north-west side of the southern peak of Lauagae Ridge, at the north-east tip of Tutuila, is a quarry area identified by a dense carpet of flakes,

with some preforms and preform fragments (AS-21-100). Two *tia 'ave* lie a short distance to the north-east and there are some traces of residential remains in the vicinity of the quarry.

At Ālega Valley a concentration of quarries and related features marks this as a prehistoric centre of small industry. On the steep slopes (c.35 degrees) at the rear of the valley are three quarries (AS-23-22, AS-23-23, AS-23-29). The lithic debris at each consists mostly of large flakes but also present are numerous smaller flakes, tool preforms and preform fragments, core pieces, and a few hammerstones. In addition, and quite surprisingly, three sherds of thick, coarse-tempered pottery were found on the surface at the east quarry. Flaking-activity areas and abundant basalt debitage and tools are found at the base of the ridge slope and on the valley floor. The extent of basalt production evidenced for Ālega seems excessive for the population of this small valley.

The largest quarry in Eastern Tutuila is at Fagasā on the north-central coast. This site was recently discovered by Herdrich and its true extent is not yet known, although it is certainly a major quarry. In fact, Fagasā may rival Tataga-matau in basalt production, though smaller in terms of affiliated defensive and other features. This quarry is still in the early stages of investigation.

In 1985, Gould, Gould, Honor, and Reinhardt (the latter name later changed to Brophy) claimed that the quantity of basalt flakes at the Tulauta site was so large that Tulauta qualified as “one of the largest basalt quarries and lithic or adze manufacturing sites in all of Polynesia” (Gould *et al.* 1985:6). As noted above, however, Tulauta was a residential settlement. Brophy (1986) placed a basalt quarry at Maupua, just north-west of Tulauta and between Lauagae and 'Onenoa. After repeated attempts, we (and, independently, Kennedy (1989)) were unable to locate a prehistoric quarry. Rather, Maupua is the site of 20th-century quarrying operations by dynamite and mechanised equipment. We can only surmise that the debris from those operations is what Brophy thought was prehistoric quarrying material. The only prehistoric site (AS-21-69) in the area is a surface scatter of basalt artefacts representing residential activity on the coastal flat nearby. The Lauagae Quarry was probably the primary source of basalt for the extensive manufacturing activities that took place at nearby Tulauta (AS-21-1).

These sites illustrate that basalt exploitation, at least on Tutuila, was more common than previously thought (Green 1974a:141). We still know too little about the large Fagasā Quarry to provide valid characterisations, but we can provide some generalisations about the other quarries in Eastern Tutuila. At each site there is a predominance of large waste flakes and often of broken preforms, a comparative rarity of complete preforms, and an absence of

completed tools showing traces of grinding. Cortex is comparatively common on the flakes, as well. These conditions indicate preliminary reduction to make preforms that were then transported to other locations for finishing work. The source of the basalt was local boulders that were naturally fractured into angular chunks. From an examination of artefact collections from the various sites throughout Eastern Tutuila it further seems that some tools were made from comparatively poor quality basalt that was probably found as isolated chunks or boulders and not from repeatedly exploited quarry sites. Some of the flakes and tools from many of the terraces on the western ridge slope of 'Aoa Valley reflect such use of poor quality basalt.

Another type of resource exploitation site is found on Mauga'ele Ridge and consists of a shallow ditch, a crude terrace, two shallow pits, and one deep pit (AS-22-18). This deep pit is 18.0 m long and 9.5 m wide, and at one end goes down nearly 3.0 m. Each of the pits is dug into reddish-brown (10YR 4/4) silty clay (particle size characterisation). Clay of this type appears in patches in this area, and the ground immediately around the pits is the more common brown clay loam, which is also present at the base of the largest pit. It appears that these pits are the result of clay extraction, perhaps for pottery or for a source of dye. Mrs Mary Pritchard, who is widely known for her expertise in traditional manufacturing of *siapo* (bark cloth), told us when she was alive that such reddish-brown clay was used to make *siapo* dye. It is at least interesting to note that *mauga'ele* can be translated as "red clay mountain". The terrace would have provided a levelled work or rest area, and the ditch, which is just up-slope from the other features, may have served to divert surface runoff from the work area and inhibit pit flooding. Small pits dug into reddish clay at a couple of other terrace sites could also represent limited extraction of clay.

TERRACE

The surveys were largely focused on the ridge tops with comparatively little coverage given to the ridge slopes. The slope investigations that did take place revealed that most sections of the ridge slopes lacked structural features. However, terraces are present in some areas, especially in the vicinity of coastal valleys. Terraces were also found occasionally on the ridge tops. Most terraces lack clear evidence of residential activity, although some have coral scatters indicative of house floors, or scatters of basalt artefacts, or both. At fortification sites, terraces were defensive features although some also may have served dual roles as temporary occupation sites.

The terrace category in Table 1 refers only to terraces that were not obviously residential and not included within the defensive complexes. These

features are usually bounded by arcing rows of boulders and typically are 15.0-20.0 m long with a maximum width of 7.0-10.0 m. The function of features in the terrace category is not clear. A few basalt tools were found on some terraces, but they do not identify site function. On some terraces basalt flakes and tools were numerous (though thick vegetation limited observations) and in a few instances grinding facets or anvil stones were present, all suggesting possible industrial functions (i.e., related to the manufacturing of basalt tools). This is certainly so for two of the terraces at Ālega and probably for a couple of the terraces near 'Aoa. Where small clusters of terraces were found they may have been *mālōloga* encampments where parties travelling overland rested, or places where groups out for pigeon-catching temporarily resided. The largest clusters, however, are on the lower ridge slopes to the west and southeast of 'Aoa valley, and are too close to the coastal communities to have served as *mālōloga* camps. Since agricultural terracing was seldom practised in Samoa, and the terraces found are usually individual structural features and not organised terracing systems, it is unlikely that many of these terraces were for cultivation surfaces. Thus, in most cases terraces were probably the sites of work and/or rest associated with the cultivation of the slopes.

PATHS

Ancient paths have been reported for Western Samoa in the form of paved or kerbed walks, raised walkways, and sunken paths (Davidson 1974c; Holmer 1976b). Probable representatives of all of these types have been found in Eastern Tutuila. On the ridge tops the sunken paths are the most common form. This is probably due to the fact that, from use, paths came to form drainage channels for surface flow of rain-water, resulting in greater erosion. Kerbstones occasionally marked the edges of the sunken paths.

OTHER SITES

A few other sites were found in small numbers and hold little or no significance for prehistoric settlement systems. Such sites include isolated artefact finds, isolated boulder alignments of unknown function, and commemorative sites such as a rock pile associated with a legendary chief, a rock with turtle petroglyphs, and old graves. Historic sites are of three types: house sites with recent materials and lacking any prehistoric items, graves, and the remains left from the U.S. military in the mid-20th-century.

ARTEFACTS

Most artefacts recovered from Eastern Tutuila are made of basalt. At most

survey sites, tools, preforms, and a sample of waste flakes were collected from the surface, while all materials recovered from excavation were retained. It is unmistakably clear that basalt tools and debitage are abundant throughout the island. A detailed discussion of the artefacts collected, particularly the basalt tools, will be presented elsewhere, and we confine our comments here to some general observations.

Adzes were plentiful, though comparatively few were recovered during test excavations. Specimens were classified according to the typology of Green and Davidson (1969b). The most common type found was Type I at nearly 50% of the total. Well represented were, in order of abundance, Type III, Type II, and Type VI. Present in smaller numbers are Types IX, V, IV, VII, and X (the last three especially rare). No examples of Type VIII have so far been recovered. This frequency of occurrence of adze types is roughly comparable to the frequencies in Frost's collection, most of which came from Tulautā. The collection is also generally consistent with that of Green (1974b) from Western Samoa, the most noticeable difference being a lower representation of Type II adzes and a significantly higher percentage of Type III adzes in Tutuila. Preforms were also abundant and ranged from very early stages of reduction to fully flaked but unground specimens.

The artefact collections from Eastern Tutuila also indicate extensive use of flake tools. This stands in marked contrast with the comparatively minor use of flake tools in Western Samoa (e.g., Green and Davidson 1969a, 1974; Jennings *et al.* 1976; Jennings and Holmer 1980). The different types of flake tools vary in shape and in the form of the working edge. These tools have been modified to create edges for scraping/grating, cutting or slicing, chopping, graving, and drilling. The identification of these items as tools is based on edge modification due to intentional flaking and/or use (all were examined under microscopic magnification). Although a full exposition of the types of flake tools recovered is beyond the scope of this report, it is clear to us that there was a greater degree of formality in, and greater use of, flake tools than has previously been granted for Samoan tool assemblages.

Waste flakes are common at sites in Eastern Tutuila but are comparatively rare on 'Upolu. Many hundreds of waste flakes were recovered from excavations at 'Aoa and at Ālega, as well as from Tulautā (Gould *et al.* 1985) and, in Western Tutuila, at Mālōata (Ayres and Eisler 1987) and Leone valleys (analysis in progress by Clark). These flakes are generally small and appear to reflect the final stage of tool manufacturing and the reworking of tools.

Obsidian was recovered only from excavations at site AS-21-5, which has yielded about 275 pieces. All of the flakes and cores are very small, as is the case throughout Samoa. Edge damage could be discerned on only a small

sample of the collection. Archaeological data from Western Samoa led Green (in Terrell 1969:168; Green 1974a:148) to the observation that obsidian in appreciable quantities occurs in association with pottery, and that pattern appears to hold in Tutuila.

Excavation at site AS-21-5 has yielded hundreds of pottery sherds, and hundreds more have been collected from the surface in 'Aoa over the last few years, particularly by local resident Mr Alofa Togia. The sherd shapes reflect simple bowls of various sizes, although one sherd has an angle similar to Green's (1974a:119) Category II bowl. The pottery assemblage includes both thin, fine-tempered and thick, coarse-tempered varieties. None of the sherds shows decoration other than possibly a slip on two or more sherds and clay floating or wet smoothing on some others. Three thick, coarse-tempered sherds were also found at one of the Ālega quarries (Clark 1992). Best recovered three plain sherds at Tataga-matau excavations, and one sherd was found by Clark at Leone Valley. Nevertheless, 'Aoa is the only known ceramic residential site on Tutuila.

DISCUSSION

Before proceeding to a discussion of the Eastern Tutuila settlement system, we shall briefly comment on other settlement pattern data in Samoa. The research of Green and Davidson (1969a, 1974) and colleagues revealed several areas of inland occupation in Western Samoa, some of which were used for residence and cultivation for at least 2000 years. Davidson (1974c:242) suggests that "the most attractive areas for settlement were those with gently sloping terrain adjacent to broad lagoons, and that soil fertility and water supply were secondary considerations". In such areas there was fairly continuous distribution of residential sites from the coast to well inland. In other areas, clustered or even nucleated settlements were found, with nucleation suggested to be a response to the presence of valued resources or a high-ranking individual (Davidson 1969a, 1974c). In most instances, with both dispersed and clustered remains, the markers of *nu'upitonu'u* status could not be identified. In short, prehistoric settlement pattern in Western Samoa was somewhat variable, often dispersed over the landscape but sometimes comparatively clustered. The depopulation of inland areas and the concentration of the population at the coast, particularly in nucleated settlements, is a pattern that developed in the early historic period (Davidson 1969a).

Investigations of extensive inland settlements at Mt Olo on 'Upolu (Holmer 1976b, 1980) and at Sāpapāli'i (Jackmond and Holmer 1980) and Letolo (Jennings *et al.* 1982) on Savai'i have also made valuable contributions to the study of Samoan settlement patterns, although we are not in full agreement with

interpretations of the investigators of those areas. The reported remains reflect widely dispersed settlement with household and larger settlement units. For Mt Olo, Holmer defined *nu'u* as corresponding to "tribal land controlled by a titular chief". That definition is inaccurate, as is his definition of a *pitonu'u* as "land used by a lineage and controlled by a local sub-chief". Such definitions, together with the archaeological data presented, give a picture of the Mt Olo settlement as consisting of a single large *nu'u* made up of multiple *pitonu'u*, each occupied by a single lineage housed in several household units demarcated by walls or walkways, and all under the authority of a single chief. Not only are the concepts of "lineage" and ruling "subchief" inappropriate, but also the overall image is misleadingly simplistic. We do not contend with Holmer's identifications of household units or with his arguments for a degree of clustering in the remains as reflected in his identification of "residential wards". However, his equating of all residential wards with *pitonu'u* is questionable. The notion that each *pitonu'u* would have only one "local chief," who occupied the high-status residence, is not consistent with ethnographic data. It is conceivable that the expanse of remains at Mt Olo, from the coast to well inland, represents more than one *nu'u*, and it is likely that the "residential wards" are not all distinct units and certainly not all individual *pitonu'u*. The proposed wards may be, for example, more in line with the residential units of some 'āiga (family) grouping. Similar findings were reported for Sāpapāli'i and Letolo, and we have similar reservations about the interpretations of those findings.

On Tutuila the rarity of gently sloping tablelands largely precludes the dispersed inland settlement found in Western Samoa. Only the gently sloping Tāfuna Plain in Tualauta County and the western plain of Tualatai County, both in Western Tutuila, could accommodate such settlements. Even though there has been no systematic survey of Tāfuna Plain, the eastern portion of the plain has been visited by Kikuchi, Frost, and the authors, and extensive residential remains have not been found. Only several *tia'ave* and possibly a few high house platforms have been reported for the plain itself, although coastal settlements were present (Kikuchi 1963:42; Frost 1978). The eastern portion of the plain is very rocky, with exposed *a'a* volcanics in some areas and thin soil elsewhere, and streams are absent. Historically the eastern plain has lacked residential settlement until recently. We find it highly unlikely that this area supported a dispersed prehistoric settlement similar to those of Western Samoa. Dispersed settlement could have existed over the western portion of the Tāfuna Plain, in the area centred on 'Ili'ili *nu'u* — that is, roughly comparable to the soil zone classified as 'Iliili extremely stony mucky clay loam" (USDA 1984). There, too, soils are thin and stream water scarce, although both are in better supply than to the east and small farm plots have

existed there historically. While no formal sites have been reported for this area, we have examined a small collection of basalt artefacts from near 'Ili'ili indicating some prehistoric activity in the area.

Dispersed settlement is much more likely to have existed on the Tualatai Plain where soils are deeper and streams present. In addition, there may have been communities dispersed around the inland margin of Tāfuna Plain, similar to the situation that existed historically (until recently), though perhaps less nucleated. In this area, streams meet the plain and sediments have accumulated. Unfortunately, these areas have not been studied archaeologically. At this point, we hypothesise that soil fertility and water availability *were* important considerations for dispersed settlement in Tutuila.

In Eastern Tutuila, prehistoric settlement was restricted largely to the lowlands in the many small valleys and coastal plains, or in the uplands on a few broad ridge tops. In the valleys, settlement probably began at the coast but gradually dispersed over the valley floor as population grew. Yet, even when the settlement was dispersed, the valleys are so small that the houses furthest from the coast were still effectively coastal. The concentration of settlement back to nucleated villages along the shoreline on Tutuila probably was, as proposed by Davidson, a late development.

This general sequence is reflected at 'Aoa by the concentration of pottery on the eastern lobe, with aceramic (apparently) occupation eventually spreading out over the middle and lower valley. Preliminary evidence from subsurface coring indicates that an embayment or a backbarrier lagoon once stood over the area where most of the valley (central and west portions) now lies. Over time, the landscape was transformed from the bay/lagoon to a backbarrier estuary to a shrinking swamp or marsh. The estuary/swamp progressively diminished and the subaerial valley floor expanded, ultimately reaching its current state with only a small residual swamp at the rear of the valley. As the subaerial valley developed, human settlement dispersed over the lower and middle valley, and eventually spread on to sections of the slopes. At some point, however, occupation of the valley shifted away from dispersed settlement of the lower and middle valleys and became more nucleated at the current *nu'u* of 'Aoa and Fa'alefu. The upper valley was probably always a zone of sparse residential occupation but intensive cultivation. Given this pattern, it seems likely that the differentiation of two *nu'u* at 'Aoa valley ('Aoa and Fa'alefu) developed by the time of, and perhaps not until, the shift back to coastal nucleation, at which time a substantial physical separation came to exist between the two communities.

Residential occupation in the uplands was much more limited. The evidence for isolated households in the uplands is equivocal; it is not clear whether isolated residential sites reflect permanent houses or temporary

houses occupied when working in the plantations or gathering natural resources. If permanent houses are represented, they are comparatively rare, and it is not yet certain that such sites are prehistoric. Small residential complexes of a few houses have been identified, but, given the size of the area investigated, such complexes are not common. These units are highly unlikely to reflect full *nu'u*.

Large residential sites at the *nu'u* or *pitonu'u* levels are even less common. Only one such site, Lefutu, exists in the two eastern counties. Beyond these counties, another ridge-top settlement was found at Fa'iga Ridge (Old Vatia), and the 'Alava Ridge site is also likely to be a settlement. Other large upland settlements may yet be found on long, broad, and flat ridge tops beyond East Vaifanua and Sā'ole counties, although there are very few such areas in Eastern Tutuila. Lefutu and 'Ālava appear to have been occupied from the last few centuries of the prehistoric period to early historic times, with the populations eventually moving to the coast. In Western Tutuila, upland valleys at Malae'imi and A'oloaufou, and on the small plateau to the west of A'oloaufou, are likely to have supported large settlements, but even in those areas settlement would have been considerably constrained in comparison with the dispersed settlements of Western Samoa.

Upland occupation throughout the island was probably relatively late and uncommon due at least in part to topographic constraints. One commonly hears in Tutuila that, "in the old days", people lived inland in order to escape the attacks of Tongans. As indicated above, however, the inland archaeological remains are far too few to support this claim of local folklore. The most frequent use of the uplands has probably always been for cultivation, resource collection, and pigeon-catching.

The most common site in the uplands is the *tia 'ave*. A lengthy review of the ethnographic, ethnohistoric, mythological, and archaeological literature by Herdrich (1991) provides a strong case for interpreting *tia 'ave* as used primarily for pigeon-catching and ritual purposes. As discussed by Buck (1930) and others, pigeon-catching was a popular competitive sport of chiefs, and appears to have been a seasonal activity (Herdrich 1991). Large groups of people moved to *mālōloga* camps a short distance from the pigeon-catching mounds, or *tia seu lupe*, sometimes for months at a time. Fowlers sat in huts built around the edge of the *tia* — presumably on the rays — and used tethered decoy pigeons to attract wild birds, which were then captured with nets. Pigeon-catching was more than just a sport; it reflected important cosmological and social relationships. We have argued elsewhere that *tia 'ave* were arenas for supernaturally sanctioned competition for prestige, status, and power (Herdrich and Clark 1991). As such, *tia 'ave* provide important markers of

Samoan social evolution.

It is quite possible that the number of *tia 'ave* in an area, and perhaps the number of projections, had some social correlates. The idealised shape of a Samoan village is like that of a *tia 'ave*. It may be that each “arm” of a settlement was the focal location of an *'āiga* headed by a high-ranking chief, which had a corresponding “arm” on the *tia* used by the entire *nu'u* (Herdrich 1991). In a related vein, each *'āiga* of a *nu'u* may have had its own *tia 'ave*, and each arm marked the location where an affiliated chief established his netting blind. Both of these patterns would have parallels with the established associations between posts and titles in the *fale tele* used for the *nu'u fonu* (meeting of village chiefs). Herdrich (1991) has argued, also, that *tia 'ave* were associated with ray-like religious/supernormal entities such as the octopus, eel, and turtle, the two former examples seeming to be preoccupied with pigeon-catching. The number of rays may have reflected which entity was affiliated with that structure.

Davidson (1969a:69) reasoned that, if “star mounds and other specialised sites” are most often associated with residential sites rather than as isolated structures, their presence may serve as useful community markers. The data from Tutuila clearly demonstrate that residential association is the least frequent occurrence, and these structures are far more likely to mark areas where residential activity did *not* take place than where it did. Furthermore, there is some indication that, where *tia 'ave* and dwellings occur together on 'Upolu, they may not be of the same age (Jennings *et al.* 1982:85). Although chronological data are limited, *tia 'ave* appear to be late prehistoric constructions, and the Eastern Tutuila sites give no reason to question that assessment. There is still much to be learned of *tia 'ave* function and chronology (Herdrich and Clark 1991).

Large mounds that provided bases for houses — presumably of high-ranking individuals — or perhaps for ceremonial activities have been reported for Western Samoa, although they are not particularly abundant. Summarising the Western Samoa data, Davidson (1974c:225-7) separates small mounds/platforms from large mounds, with large mounds identified by a length of over 30 metres, even though smaller examples are included due to their heights of over three metres. On Savai'i, large mounds are normally constructed of rocks, whereas earthen mounds are the norm for 'Upolu. Though sometimes found individually, large mounds usually occur in groups. The largest mounds and the most impressive complex is at Pulemelei, Savai'i. Large mounds do not appear in Western Samoa until the 11th century A.D. or later.

Neither small mounds/platforms nor large mounds were found in Eastern Tutuila. In the Tāfuna area of Western Tutuila, 10 high “platforms” have been

reported, although some of these were badly disturbed and some were based on informant information only, having been destroyed before Kikuchi's visit (Kikuchi 1963; Frost 1978; Clark 1980). Yet, as noted by Frost (1978:255), none of these structures falls into the large mound category. Davidson (1974b) regarded large mounds as reflecting supralocal authority, which led Frost to suggest that the absence of such mounds on Tutuila could reflect the lack of supralocal authority on that island. In fact, however, the absence of large mounds tells us nothing, since such mounds are also absent from Manu'a, which unquestionably had supralocal authority.

The only other feature of note previously reported for Western Samoa but not yet identified in American Samoa is the raised-rim *umu tī*, which was a large pit-oven used for roasting *tī* (*Cordyline fruticosa*) roots. At some of the residential settlements reported are pits that have been tentatively identified as food pits for the storage of bananas or the storage and fermentation of breadfruit (*masi* pits). This is speculation since none was excavated and they have no uniquely distinguishing characteristics. Some could be large pit ovens, but charcoal was not visible at any of them and none had associated oven stones, although some boulders were found on the inner edges of a couple of pits. In any case, these pits do not appear to be *umu tī* because none has the characteristic raised rim and shallow internal depression, and *umu tī* reportedly were made in the bush, not in settlements (Davidson 1974c:236). The absence of *umu tī* is surprising, given Davidson's observation that they are "the only relatively numerous and regular pit feature which can be confidently identified in Samoa" (Davidson 1974c:238).

Defensive features and fortification sites are found on islands throughout the South Pacific, and Green (1967) has suggested that "fortifications are part of an ancestral pattern of Polynesian warfare". In Samoa and throughout the region, fortified sites were sometimes established on flat ground but were more commonly highland sites. In the early 1830s, Williams (1984), for example, wrote that Samoan villages had forts, or *'olo*, which were generally on high mountains: "to this they remove their property, wives and children erecting temporary huts of cocoa nutt [sic] leaves inside". Wilkes (1845:151) later described *'olo* as "usually on the top of some high rock, or almost inaccessible mountain, where a small force could protect itself from a larger one". Historically — and presumably in late prehistory — bank-and-ditch fortifications supported palisades with log-gate entries, and there were occasional fighting platforms (Erskine 1853:75; Krämer 1902-3:2:337).

Archaeologists have reported numerous defensive features and fortification sites for Western Samoa (Buist 1969; Golson 1969; Green 1969; Scott and Green 1969; Scott 1969; Davidson 1969b, 1974a, 1974c). Defensive

ditches — with and without earthen embankments — have been found as isolated features crossing a ridge top, and Davidson (1974a:181, 191) reported a couple of ridge-top sites on ‘Upolu where there is a *tia ‘ave* with a defensive ditch just off the end. Several highland forts have been reported (e.g., Buist 1969), also, but Davidson (1974c:241) noted that they are not as common as isolated or small groups of defensive features. The best information on highland forts is from the large complex at Luatuanu‘u, which probably dates to the middle of the first millennium A.D. (Scott and Green 1969:208). This site is high on a ridge top and comprises earthen embankments, pits (some probably borrow pits), deep ditches, and terraces strung out over a long, sometimes very narrow, ridge top.

On Tutuila, defensive sites are comparable to those of Western Samoa. In both areas, isolated ditches, ditch-*tia ‘ave* combinations, and hilltop complexes are present. Highland forts are centred on Le‘aeno and Olomoana peaks where steep side slopes and ridge-top terraces — with their high embankments — provided strong defensive positions. The location and form of the terraces, together with the absence of domestic features and artefacts, indicates that they are highly unlikely to have been features *primarily* associated with agricultural, residential, or *mālōloga* activities. However, the terraces could have served as bases for temporary occupation during times of refuge at the forts and, once established, they also could have served as *mālōloga* encampments for travellers, pigeon-catching parties, or, at Le‘aeno, groups exploiting the basalt quarries. Other defensive features at Le‘aeno, such as the massive boulder facing and the several large ditches, further inhibited approach by enemy combatants. When both sites of the Le‘aeno Mountain fortifications are taken as a whole, and together with the *tia ‘ave* and nearby basalt quarries, we see a very large complex with parallels to Tataga-matau, although not as large (especially in the extent of basalt exploitation).

Large fortified complexes at Le‘aeno, Olomoana, and Tataga-matau reflect the occurrence of large-scale warfare on the island. These hilltop forts are significantly different from the upland settlements discussed above which, while occupying potentially defensible positions, lacked complexes of defensive features. All three of these forts lie on high points at or very near the junctures of two or three modern district boundaries, and these boundaries approximate those of ancient sociopolitical units. This suggests supralocal organisation and authority involving three levels — the *nu‘u* (village), the *itū* (district, or units of multiple linked *nu‘u*), and district alliances. Such sites were probably used by people throughout the districts during times of conflict with the other districts, other Samoan Islands, or perhaps Tongans, rather than as forts employed during purely local conflicts. Defensive complexes may

well be found on any of the major peaks on Tutuila, and we would expect the largest fortifications to be found on the highest peaks on the boundaries of two or more counties.

It is now apparent that valued resources — i.e., obsidian and basalt — were exchanged between islands in Samoa and beyond. Furthermore, it appears that Tutuila was an important source, if not *the* source, for those resources. Geochemical studies have recently shown that basalt from Tutuila reached not only Western Samoa, but Fiji, Tokelau, and probably other Island groups (Best 1984, Best *et al.* 1992). This observation is consistent with the abundance of basalt tools, flakes, and quarries on Tutuila relative to Western Samoa. Other studies indicate that obsidian from ceramic sites in Western and American Samoa came from the same island (Sheppard *et al.* 1989), and that the source island was in all likelihood Tutuila (Wright and Clark n.d.). The excavation data from AS-21-5 indicate that, as the use of obsidian diminished, the use of basalt increased. We hypothesise that a similar relationship held with the exchange of those materials to other islands. The existence of several small basalt quarries on Tutuila suggests local exploitation by *nu'u* or small groups of *nu'u*. Tataga-matau may have been the principal supplier of trade basalt, but it was not the sole supplier.

CONCLUSION

The primary goal of the Eastern Tutuila Archaeological Projects was to retrieve data on the prehistoric settlement system that existed on Tutuila. That required the recovery of information on the variety of sites that existed on the island, the distribution of those sites, the interactions that took place over time between humans and their environmental surroundings, and the social and economic relationships that existed between communities. This information is of value not only for what it tells us about the specific area of study, but also because it provides important data for the regional picture.

The Eastern Tutuila investigations added 176 new sites to the site inventory of American Samoa. Among these are sites not previously known for the district, including a ceramic residential site, *tia 'ave*, basalt quarries, and highland forts. In addition, the research led to reinterpretations of important, previously reported sites at Tulauta, Maupua, Lefutu, Fa'iga, and Mt 'Alava, and provided significant new data on the distribution, construction, and function of *tia 'ave*.

Comparison of archaeological data from Western and American Samoa reveals interesting differences and similarities. Most of the site types known for Western Samoa are now known for American Samoa. Not only is a ceramic site present on Tutuila, but it may also be contemporaneous with

Mulifanua, 'Upolu, the only Lapita site in the archipelago. Surprisingly, however, the characteristic Lapita decorations are absent. The other striking absences from American Samoa are the large house mound and the *umu ti*. Because of topographic constraints, inland settlements on Tutuila are less extensive than those in Western Samoa, and the large dispersed settlements have not yet been documented for Tutuila. Large fortifications reflect intensive warfare, probably between district alliances and possibly with other islands, both levels being ethnohistorically well documented (e.g., see Freeman 1983; Meleisea 1987). Basalt exploitation and tool manufacturing sites have been shown to be more common on Tutuila than elsewhere in Samoa, placing Tutuila at the centre of an important exchange or trade system that reached beyond the archipelago. A differential emphasis in stone tool use has been found between Tutuila and Western Samoa, reflected by the number of quarries and a greater use of flake tools. Furthermore, geochemical analysis indicates that the volcanic glass artefacts from sites on 'Upolu originated on Tutuila. Thus, not all interisland contacts were violent.

The coring programme has provided valuable data that reveal complex human-environment interactions on the island. The landscape at 'Aoa has undergone a dramatic transformation since human settlement, and human actions played a role in the transformation process. The same appears to be true at 'Alao and elsewhere (i.e., Leone, but those data cannot be discussed here). At the same time, it is possible that relative sea level may have undergone significant change unrelated to the human factor. To what extent coastal lowlands in Western Samoa have undergone geomorphological change remains to be documented, but we suspect that significant changes have been common occurrences. Additional studies specifically directed at revealing the sea-level history of the island are now under way and will provide much needed clarification of the relationship between human settlement and environment in the archipelago.

Finally, the research in Eastern Tutuila has provided abundant evidence of previously unsuspected complexity in the archaeological record of the island. With only a portion of Tutuila surveyed so far, a wealth of information remains to be uncovered. Although there is still much to learn about each of the research issues investigated, significant progress has been made in understanding the settlement systems of prehistoric Samoa.

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Location: County and Ridge/Slope	Residential			Tia 'ava	Defence	Resource	Terrace	Path	Other			TOTAL
	Large	Small	Single						Misc.	Historic	Military	
I. East Vaifanua												
Sua				2	1	1		1				5
W. 'Aoa	2	2	2	2			7					13
W. 'Aoa Slope		3		1			11					14
Leila								1				1
Leila Slope				3								3
Patupatu				2	1							4
Olomoana				2				1				4
Afimua	1	1	4						1		1	8
Afimua Slope		2					5					7
Ogefao	1											1
Lefao	1		2									3
Lefutu			7					2				11
Lauagae	1	2	2			1			1		3	9
Fagasa									1	1		3
Vaimumu	1			6				2	1	1	1	11
Saifilagi								1				1
W. Toiloto								1				1
Maugaleo'o			3									3
Motusaga	1	7	10	37	2	2	30	3	4	3	5	104
Subtotal												
II. SA'OLE												
Motusaga				1				1				2
Tiatele	1			1								2
Mauga'ele	1			2					2			5
Leo'o				2					1			3

Location: County and Ridge/Slope	Residential			Tia 'ava	Defence	Resource	Terrace	Path	Other			TOTAL
	Large	Small	Single						Misc	Historic	Military	
Olomoana			3						1			4
Laloi			1									1
Leauga			2			1		1		2		5
Asiapa		1	4			1		1				7
Singaga			1									1
Filima'oi			2				2					4
Subtotal	0	2	1	19	0	1	3	2	4	2	0	34
III. SUA												
Sua			1		1							2
Usi			2			2	1					5
Aonoi			1				2					3
Vaipito			2									2
Mauga'oaali'i									2			2
Ālega West			1				5					6
Ālega North						3	4					7
Subtotal	0	0	1	6	1	5	12	0	2	0	0	27
IV. WEST VAIFANUA												
Fa'iga			1									1
V. MAUPUTASI												
'Alava			1									1
TOTAL	3	9	12	62	3	8	45	5	10	5	5	167
PERCENTAGES	1.8	5.4	7.2	37.1	1.8	4.8	26.9	3.0	6.0	3.0	3.0	100

Table 1. Distribution of sites in uplands of Eastern Tutuila, listed by county and ridgetop on ridge slope.