Hawaiian Architectural Transformations during the Early Historic Era

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DURING THE TRANSITION from the late prehistoric to early historic era in Hawai'i, the morphology of residential features underwent significant change. Typically, prehistoric house sites were composed of several discrete single component dwellings in which specific activities were conducted. The ethnohistorical data indicate that pre-Contact Hawaiian beliefs dictated the spatial separation of activity areas within a household. In contrast to the morphology of prehistoric households, historic residential features usually contained a number of contiguous platforms, pavements, and terraces. The activity areas within these households had been spatially collapsed into adjoining localities. This contrast suggests that Hawaiian settlement patterns should not necessarily be considered the reflection of ecological adaptation or social organization but in fact may be viewed as the result of people actively creating and manipulating their cultural landscape according to their symbolic systems. By recognizing that residential features reflect the builder's cognitive categories, it is possible to archaeologically document through architectural variability, several aspects of the ideological change that occurred during the early years of European contact.

This paper documents changes in architectural style from the prehistoric to the historic using a statistical analysis of 467 hectares in the southeast section of Hawai'i Volcanoes National Park (Fig. 1). Intensive surveys over the past 14 years have mapped a 6-km coastal transect that ranges in width between 0.4 km and 1.2 km, and a 3.7-km inland transect that ranges in width between 0.3 km and 0.55 km. The survey program produced a series of 88 base maps. Each map or quadrant is 400 by 200 meters, although some areas within the quadrants were not completely surveyed.

DATA ANALYSIS

A computerized data base was used to establish statistical patterning in the archaeological record (Ladefoged 1987, Ladefoged et al. 1987). Architectural features

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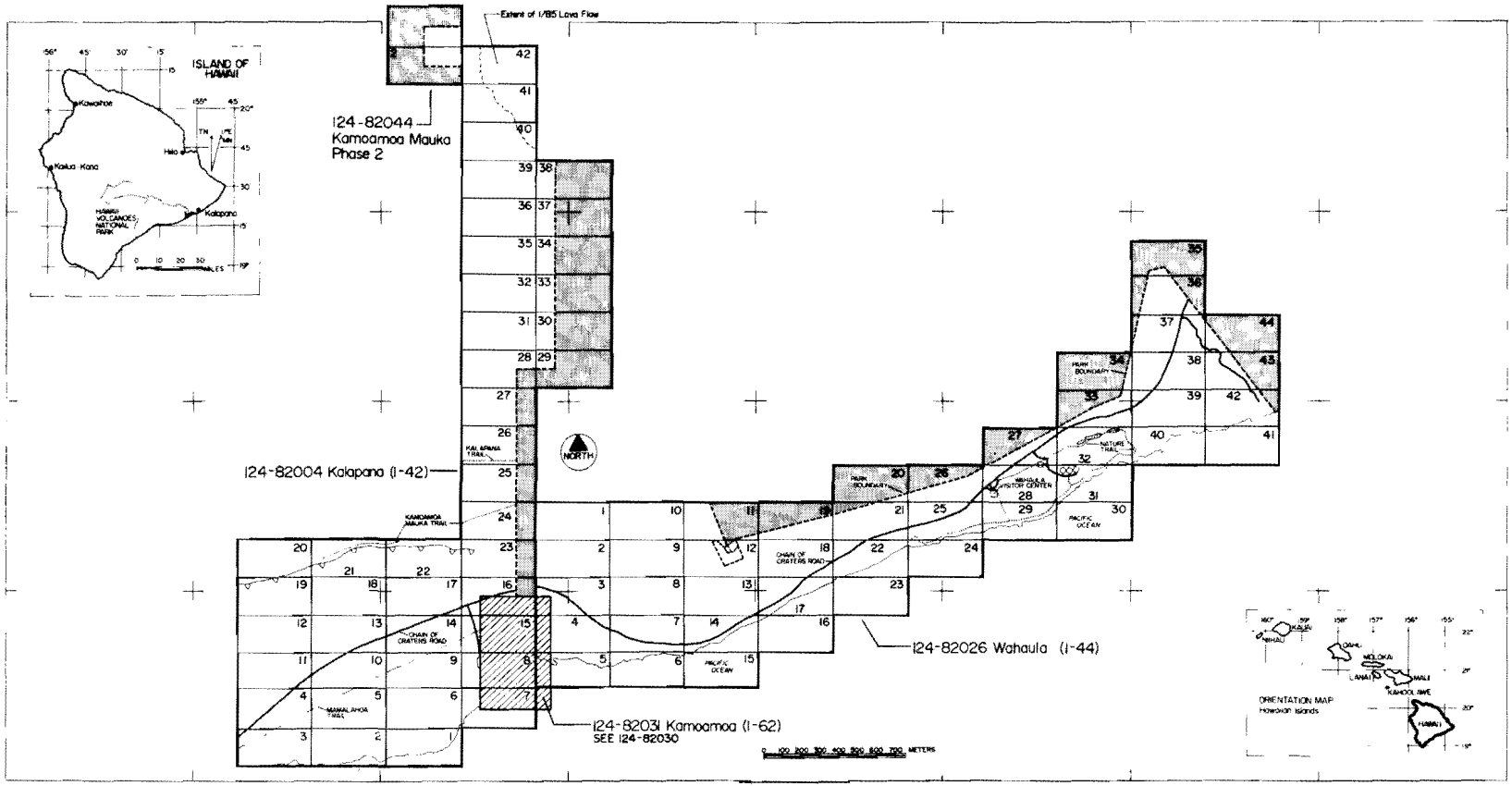

Fig. 1. Detailed study area within Hawai'i Volcanoes National Park, Hawai'i.

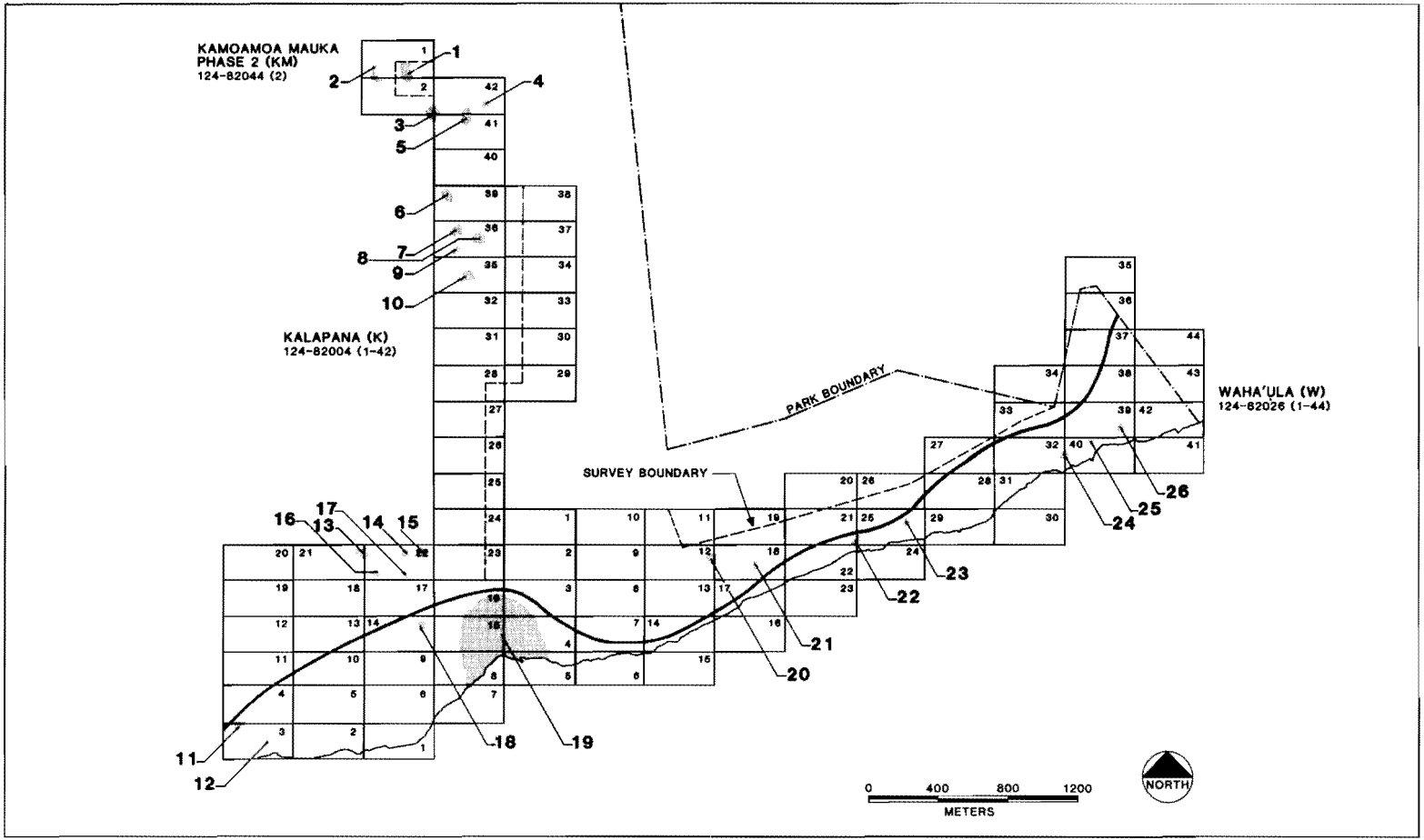

Fig. 2. Residential complexes in the detailed study area.

were defined as the basic unit of analysis for the inventory of archaeological remains depicted on the base maps (Weisler and Kirch 1985, in prep.). Architectural features generally contained a number of different components, such as pavements, terraces, and slab-lined pits. Residential features were grouped into complexes that might be thought of as potential households (Fig. 2). Complexes were in turn grouped into settlements. Architectural features were initially classified according to morphological criteria. Later functional descriptions were assigned. Residential components and features were defined as platforms, terraces, and pavements that were not categorized as religious structures, agricultural features, et cetera.

Of the more than 15,000 components and features recorded in the study area, 486 were identified as residential. Seventy-six percent of the residential features were grouped into 26 different residential complexes (see Fig. 2). These 26 complexes form a minimum of 8 different settlements. There are at least two ways of grouping the residential features for statistical comparisons. The first is to contrast the residential features in "coastal" complexes with those in "inland" complexes. Complexes 1 through 10 are grouped as inland complexes, whereas complexes 11 through 26 are considered coastal complexes. The second way of grouping residential features is to compare the residential features in the coastal settlement of Ka'ili'ili, composed of complexes 22 and 23, with those in the inland settlement of Kamoamoa Mauka #1, which contains complexes 1 through 5, and Kamoamoa Mauka #2, which contains complexes 6 through 10. Linear correlation and independent group t-tests were used to establish statistical patterns between the groups of architectural features.

The results of the statistical tests indicate that distinct zones within the study area have different morphological types and sizes of residential features. Both coastal and inland areas are characterized by similar densities of residential features (1.47 and 1.63 features per hectare, respectively). This suggests a similar intensity of residential use in the two areas. However, there is variation in the size and complexity of the features across the two zones. The mean area of residential features in coastal complexes (85.76 m^2) is significantly larger than the mean area in inland complexes (21.93 m^2). Furthermore, the area of individual components and single component features is significantly larger along the coast (29.08 m^2) than in the inland zones (16.27 m^2).

The number of components contained in individual residential features varies between coastal and inland complexes. A measure of this characteristic is the ratio of the total number of residential components divided by the total number of residential features. If a complex or settlement has a large ratio of components to features it has few spatially discrete features and a larger number of components that are spatially contiguous that form a few multicomponent features. For example, the two features shown in Figure 3 have a total of seven individual components resulting in a ratio of components to features of 3.5. If a complex has a smaller ratio of components to features (i.e., closer to one), the residential features of the complex consist of single residential components that are spatially separate from one another. In Figure 4 there are six features, each with a single component, producing a ratio of components to features of 1.

The ratio of components to features in the coastal settlement of Ka'ili'ili is 2.14. This is significantly higher than the ratio of 1.11 for the inland settlement of Kamoamoa Mauka #1. As can be seen, the residential features of the coastal settlement are generally quite large and consist of several contiguous pavements, with a surrounding core-filled wall (Fig. 5). In contrast, the residential features of the in-

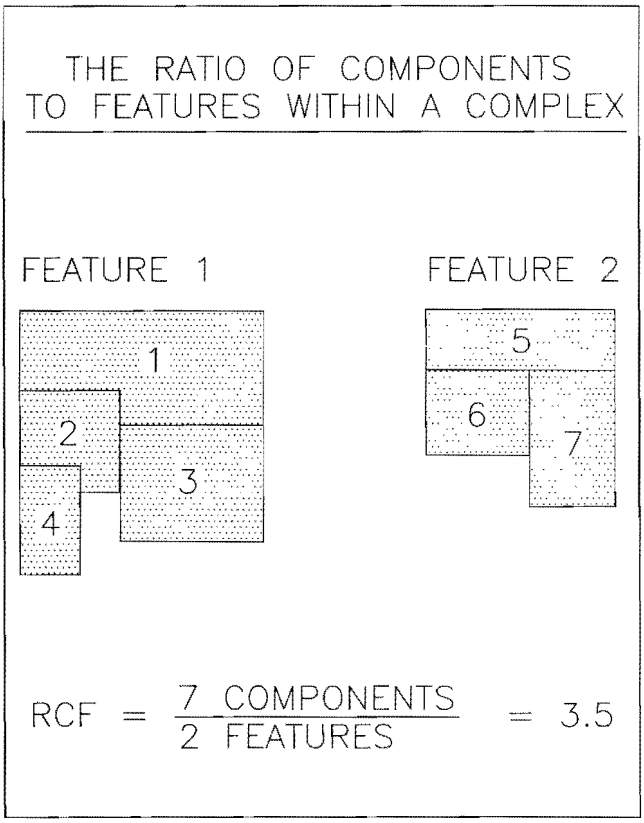

Fig. 3. The ratio of components to features within a complex; RCF = 3.5.

land settlement are usually simple single component platforms and terraces (Fig. 6).

The National Park Service has conducted limited test excavations at four residential features in the coastal Ka'ili'ili settlement (HV-286, HV-287, HV-288, HV-294) (Carter and Somers 1990). An analysis of the excavated materials is pending, but there are nine radiocarbon dates from three residential features (Carter and Somers 1990:31) (Table 1). Eight of the nine dates have calibrated one-sigma ranges that extend or are contained completely within the historic era. Six of these dates overlap with each other in the early historic period, and two additional dates overlap with each other in the late historic period. The large degree of overlap in the early historic era suggests that this is a time period when the features were most likely occupied. In sum, the radiocarbon dates strongly suggest that Ka'ili'ili settlement was predominately occupied during the historic era.

Because of the limited number of radiocarbon dates from residential features throughout the study area, a historical index was calculated to place the features in a relative chronology. Historical indices are the percentage of "historic" components and features in relation to the total number of components and features. Historical components and features are defined as core-filled walls, core-filled enclosures, curblined trails, historic graves, tin roof remains, water tanks, windmill remains, and historic wells. The coastal complexes had a historical index of 2 percent, which

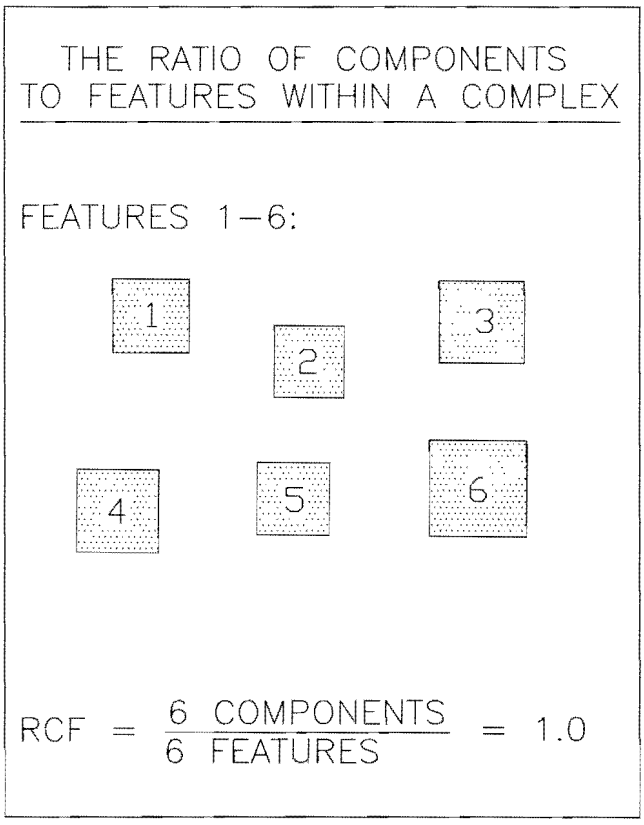

Fig. 4. The ratio of components to features within a complex; RCF = 1.0.

is significantly higher than the historical index for the inland complexes, which was 0.1 percent. The coastal settlement of Ka'ili'ili had a historical index of 20 percent, which is significantly higher than the historical index for the inland settlements of Kamoamoa Mauka #1 which was 0 percent and Kamoamoa Mauka #2, which was 3 percent.

A final statistic worth noting is that there is a positive correlation between the historical indices and the ratios of components to features when Ka'ili'ili and the inland settlements are considered. The positive correlation suggests that "historic" residential features have many more architectural components than prehistoric features.

DISCUSSION

Green (1984:63) notes that in the past Polynesian settlement pattern studies have used either a settlement-subsistence theoretical framework or a settlement-social organization approach. Accordingly, the residential features in Hawaii Volcanoes National Park might be interpreted from either of these perspectives. It is possible that the archaeological remains reflect differential land usage of distinct environmental

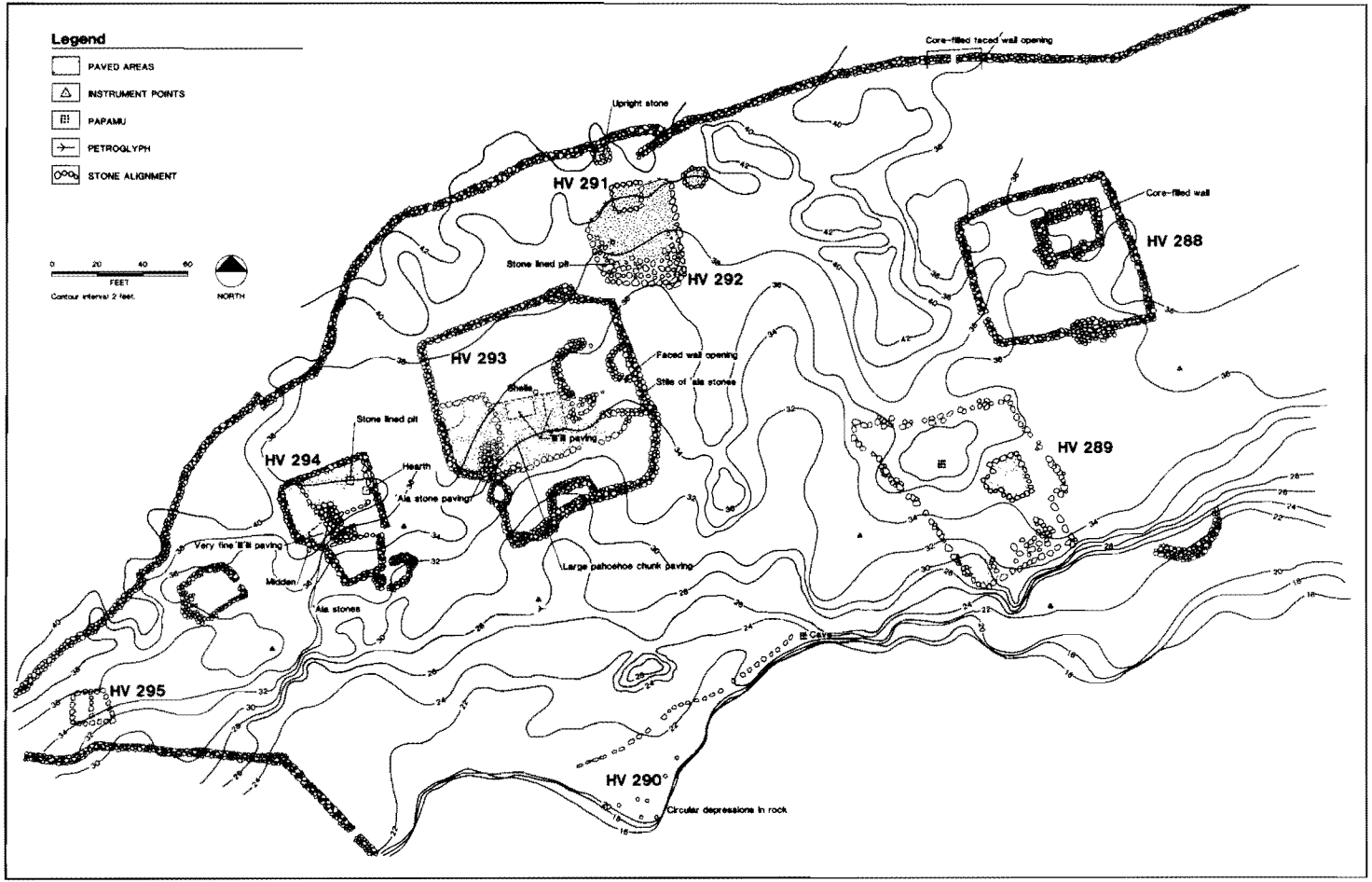

Fig. 5. A portion of Ka'ili'ili settlement.

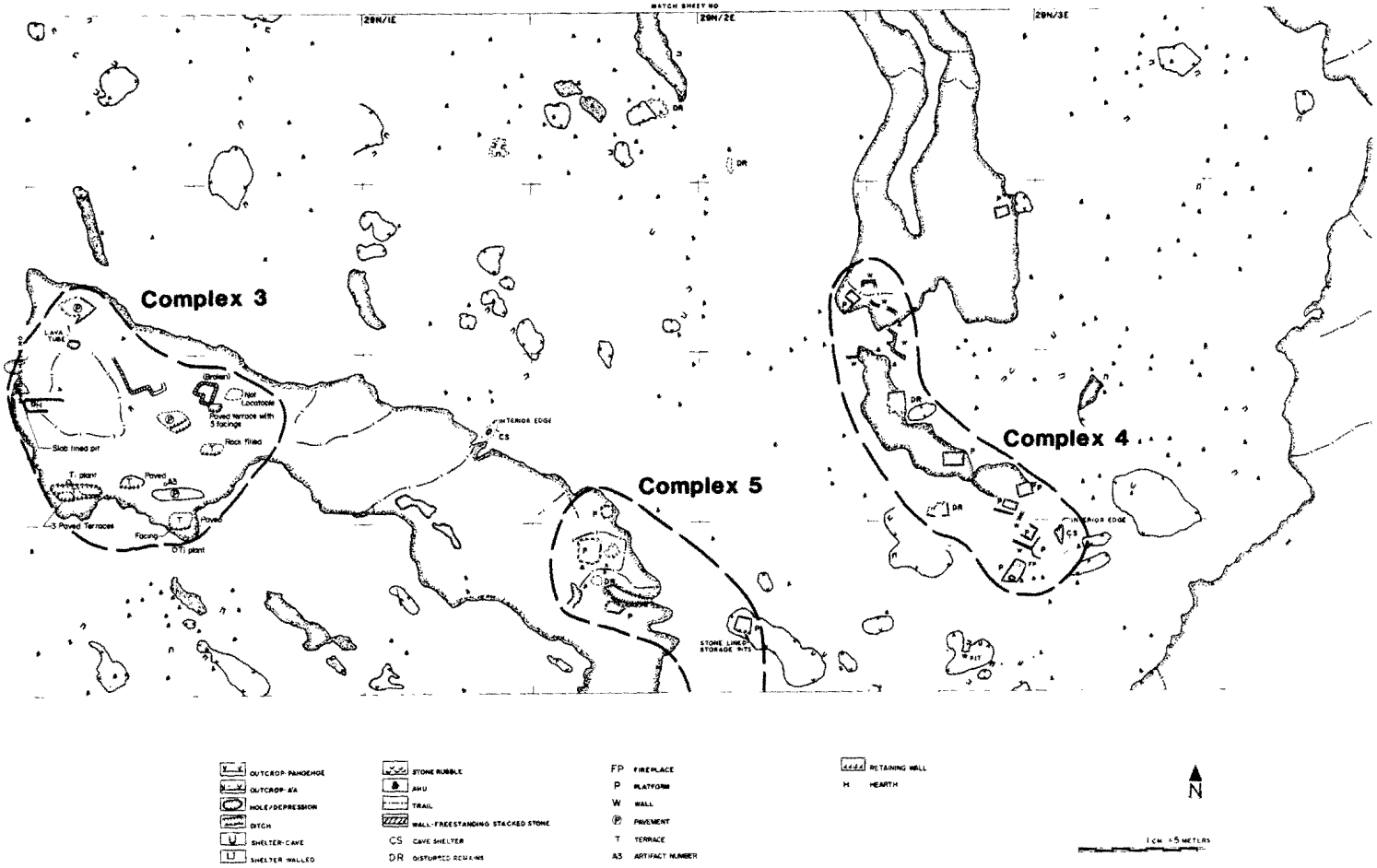

Fig. 6. Complexes 3, 4, and part of 5 in Kamoamoa Mauka #1 settlement.

TABLE 1. RADIOCARBON DATES FROM KA'ILI'ILI SETTLEMENT

FEATURE	MATERIAL	BETA ANALYTIC NUMBER	^{13}C ADJUSTED AGE	CALIBRATED AGE[1]	CALIBRATED RANGE (1 SIGMA)
HV 286 A (LII/1)	Shell	33643	740 ± 50	A.D. 1682	A.D. 1644–1796
HV 286B (LI/3)	Shell	33644	700 ± 70	A.D. 1704	A.D. 1658–1865
HV 287A (G1-LII/3)	Charcoal	33645	160 ± 90	A.D. 1678 A.D. 1739 A.D. 1804 A.D. 1938 A.D. 1955	A.D. 1650–1955
HV 287A (G2-LII/1)	Charcoal	33646	10 ± 70	A.D. 1955	A.D. 1893–1955
HV 287C (LII/3)	Charcoal	33647	40 ± 60	A.D. 1955	A.D. 1707–1955
HV 287D (LI/2)	Charcoal	33648	220 ± 50	A.D. 1659	A.D. 1645–1955
HV 287F (LII/2)	Charcoal	33649	190 ± 60	A.D. 1668 A.D. 1751 A.D. 1758 A.D. 1777 A.D. 1796 A.D. 1947 A.D. 1953	A.D. 1650–1955
HV 287F (LII/4)	Charcoal	33650	370 ± 70	A.D. 1487	A.D. 1439–1637
HV 294B (LI/1)	Shell	33651	520 ± 80	A.D. 1955	A.D. 1864–1955

[1] ATM10. ^{14}C Calibration (Stuiver and Becker 1986); Marine. ^{14}C Calibration (Stuiver, Pearson, and Braziunas 1986).
Note: From Carter and Somers 1990:31.

zones. Several early historic accounts document the Hawaiian practice of living permanently along the coast in conjunction with seasonal occupation of inland field shelters (Remy 1975:30). The archaeological remains in the study area coincide with proposed correlates of this pattern (see Ladefoged et al. 1987:100–103 for a discussion of criteria proposed by Rosendahl 1972, Green 1980, Clark and Kirch 1983, and Clark 1987). The larger, more elaborate coastal residential features might have been the permanent households, whereas the smaller, simpler inland features found in association with agricultural features might have been temporary shelters occupied during the harvest and planting seasons.

The second traditional interpretative framework considers the Hawaiian archaeological record as a reflection of social stratification. One criterion that has been used to distinguish commoner from elite households is the total area of a sleeping house (Cordy 1981). The underlying assumption as proposed by Cordy (1981:81) is that "the labor expenditure involved in permanent housing construction positively covaries with the social rank of the household's highest ranking member." There are serious problems with this isomorphic relation, and as a result Weisler and Kirch (1985:148) have proposed additional criteria. If the residential features in the study area are evaluated against these criteria, it might be proposed that the larger, more elaborate coastal features found in association with religious features were occupied by the elite, and the smaller, simpler, inland residential features located in an arable zone were inhabited by commoners.

Both of these interpretations assume that the residential features throughout the study area are contemporaneous. However, the nine radiocarbon dates and the historical indices suggest that not all of the features were occupied during the same period. An alternative interpretation provides insights into a diachronic understanding of the settlement pattern.

Several recent studies have shown that architectural elements of a settlement pattern were created by individuals acting within a particular historical context (Hodder 1986, 1987; Shanks and Tilley 1987). As such, architectural features can be considered as meaningfully constituted symbolic constructs (Hamilton 1987). Residential features are effective symbols for displaying beliefs because people usually interact in and around them on a daily basis. They are large, conspicuous, and can often be viewed from a distance, making them an efficient means of displaying symbolic messages (Wobst 1976). The organization of buildings channels or directs people's behaviors, which in turn, reinforce the belief systems that initially influenced the style of the buildings (Glassie 1987; Hamilton 1987; Kus 1983). Finally, residential features are enduring symbols that can be used to define an individual's relation to other members of society (Lane 1987:58). Because of these characteristics, the architectural features and settlement pattern in Hawai'i Volcanoes National Park probably document some aspects of the Hawaiian ideological transformation that occurred during the early historic period.

Late prehistoric Hawai'i has been interpreted as a theocratic feudal society (Valeri 1985*b*:84). Although there might be problems with these labels, Valeri (1985*b*) analyzed the ethnohistoric literature and suggested that one method for maintaining the system was achieved by promoting the belief that the elite were genealogically closer to the gods than the commoners. This genealogical connection made the elite *kapu* or divine, and endowed them with *mana*. *Mana* is an efficacious power that can increase or decrease depending on a person's success and purity (Shore 1989; Valeri

1985*a*:97). To maintain *mana* and purity, people avoided profane objects and contexts.

One method of maintaining *mana* by separating the sacred from the profane was to spatially segregate activity areas. On the basis of the ethnohistoric literature, it is known that the prehistoric Hawaiian household contained a number of distinct buildings that were used for different purposes (Malo 1951). Green (1986:53) suggests that this household configuration was part of an ancestral Polynesian culture. A typical household might include a sleeping house, a men's house, cooking houses, eating houses, work areas, and possibly a canoe shed. The journals of the early Europeans explicitly state that the interiors of these houses were not partitioned or physically subdivided (Ledyard 1963:128; Ellis 1979:225; Campbell 1967:130).

The inter-cultural confrontation of Hawaiian and western societies created and exposed political, economic, and religious contradictions inherent in the *kapu* system (Davenport 1968; Harfst 1972; Levin 1968; Sahlins 1981, 1985). In 1819 the *kapu* system was abandoned, and the power of the elite was no longer directly associated with *mana*, purity, and genealogical connections to the supernatural. After the abolition of *kapu* there was less cultural pressure on maintaining purity. Activities that were previously considered polluting could take place in spatially contiguous areas. With this cultural transformation, the Hawaiians were able to incorporate foreign notions of domestic space possibly in an effort to symbolically associate themselves with Europeans for economic gain.

The historic de-emphasis of *mana* is congruent with the settlement pattern data from the study area if we accept the evidence that the inland settlement of Kamoamoa Mauka #1 was occupied largely prior to contact, whereas the coastal settlement of Ka'ili'ili was built and occupied during the historic period. Kamoamoa Mauka #1 has a significantly lower ratio of components to features than Ka'ili'ili. This ratio is a measure of the spatial discreetness of activity areas. In Kamoamoa Mauka #1 the activity areas were spatially set off from one another. This spatial configuration might have reflected the desire to separate sacred and profane activities in an effort to maintain purity. At Ka'ili'ili settlement, different activity areas still existed within households, but these were no longer spatially segregated. In fact they appear to be components of one contiguous feature. The radiocarbon dates, the positive correlation between the ratio of components to features, and the historical indices suggest that this transformation occurred during the early historic period.

The residential features at Hawai'i Volcanoes National Park reflect the structural transformation of Hawaiian society during the historic era. During this period, indigenous concepts of purity and power reflected in the spatial segregation of residential activity areas were subsequently replaced with Western notions in which household activities were spatially integrated. Recognizing this diachronic interpretation directs our attention to other variables that may affect the morphology of architectural units, other than relative social status and ecological adaptation. The research also suggests that it is possible to tentatively establish the relative age of residential features on the basis of their morphology.

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